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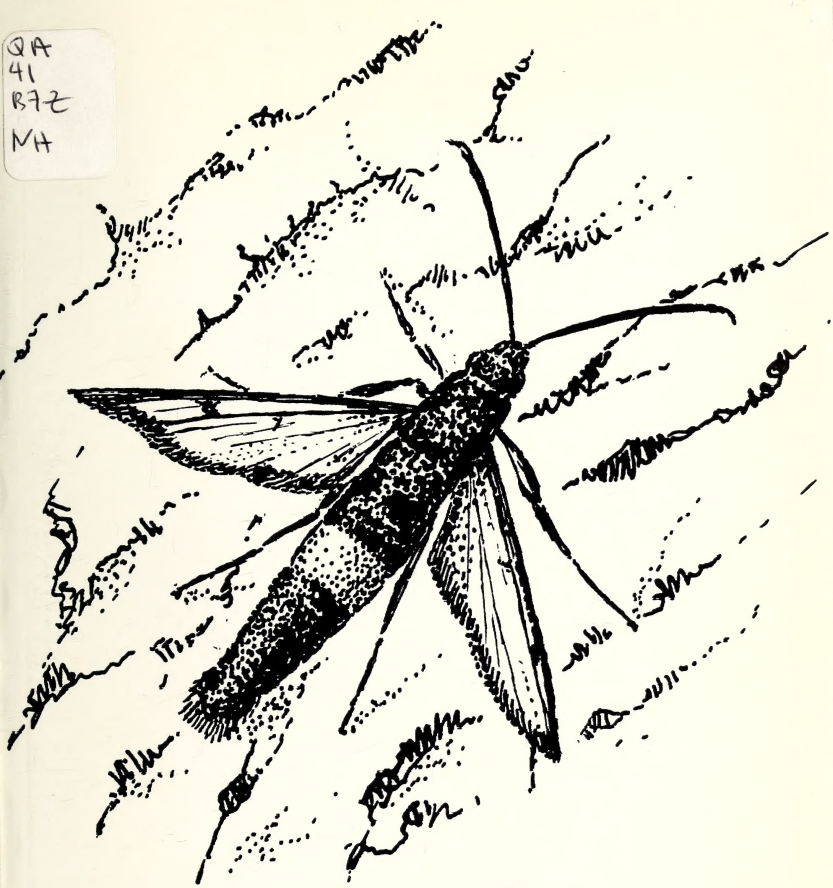

# NATURE IN AVON

PROCEEDINGS OF THE BRISTOL NATURALISTS' SOCIETY 1998

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THE PROCEEDINGS OF THE BRISTOL NATURALISTS' SOCIETY

VOLUME 58 (for 1998)

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ASSISTED BY A COMMITTEE

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| H. TETLEY | 1942 | R. J. BARNETT | 1995 |
| | | R. L. BLAND | 1997 |

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Cover design. Red-belted Clearwing by K Poole

# COUNCIL 1998

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| | |
|---|---|
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| | | |
|---|---|---|
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| Geological | President | Mr D. W. Cope |
| | Vice-President | Mr S. Carpenter |
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| Ornithological | President | Mr R. L. Bland |
| | Hon Secretary | Dr M. Hill |
| Mammal group | Leader | Mr D. C. P Trump |
| - | | |
| Invertebrate Group | Leader | Mr A. G. Smith |

Other members of Council: Mr M. Evans. Mr J. Evans. Mr J. M. Gething
Miss J. Boyd. Miss S. L. Myles. Mr N. J. Wray

Past presidents: Miss M. H. Rogers. Mr D. A. Wilson. Mr R. J. Barnett

## REPORT OF COUNCIL 1998

**1 Education**

The Society held 29 indoor meetings, and 56 field meetings, dealing with a wide range of topics. Members helped with the Avon Wildlife Trust's educational programme at Willsbridge Mill, assisted in classes and workshops run by, among others, National Trust, the Conchological Society, and the Somerset Environmental Record Centre. They were also involved in teaching in the Department of Continuing Education. The Society's library, housed in the Bristol City Museum and Art Gallery, was used by Museum staff and members of the society. Work continued on reorganising part of the Society's collection, and creating more space for archive material.

**Publications**

a) The ***Avon Bird Report*** for 1997 was published in September 1998. It was 152 pages long, and included an original article on the Diet of Urban Peregrines, and reports on the Breeding Birds Survey, the Rookery Survey, and Ringing in the region in 1997.

b) The monthly **newsletter** was further improved by the new editor to ensure that all members were kept in close touch with the activities of the society.

c) Details of the Society were available on the Digital City web site organised by Bristol City Council at http://www.bristol.digitalcity.org

**3 Research**

**a)Botany.** Members continued to be involved in the Flora 2000 scheme and the Avon Flora Project. A Titchen continued to add to his detailed record of the trees, both native and alien, of the area. Members are supporting The Millennium Seed Bank project organised by the Royal Botanic Garden, Kew.

**b) Ornithology**. Members were involved in all the major British Trust for Ornithology and Wetlands and Wildfowl Trust surveys, and completed a breeding season tetrad survey of the region.

**c) Geology**. Members supported Avon RIGS (Regionally Important Geological & Geomorphological Sites) initiative which involved both site recording and clearance, and liaised with the geology staff of the Bristol City Museum.

**d) Invertebrates.** Members were involved in recording Butterflies, Moth-trapping, and with a new Dragonfly recording scheme and the District Hoverfly Group, all in co-operation with BRERC. Other taxa are also being mapped in surveys for the Somerset Invertebrate groups, and as part of Somerset's

biodiversity surveys and work was done for the Mollusc Atlas and searching for Plant Galls.

**e) Mammals.** Members were involved in the regular small mammal survey of the Gordano Valley NNR, checking and maintaining bat boxes at Chew Valley and Blagdon Reservoirs in association with the Avon Bat Group, and working with both BRERC and the national Mammal Society.

**5 Conservation**

The Society participated in the Peregrine Watch, The Forest of Avon Fair, the Wildlife Trust Fair, and was represented at the annual meeting of the Leigh Woods Management Committee, and at meetings of the Severn Estuary Management Group. The Society's Conservation Officer, Dr WE Dixon, represented the society on the Avon Wildlife Trust conservation committee. He has created a template for site descriptions of wildlife reserves. Members are involved in the management of Lower Woods, Wickwar. Members of the geological section installed geological Interpretation Boards at two sites in Bristol, and exhibited at the Geological Annual Reunion in London. Grants were made from the Hector Hockey Fund in the course of the year to support a guide to the Stoke Bishop nature reserve, a new Geological interpretation board, new bed labels at the University Botanic gardens, and research into the genetics of Polyanthus variants.

**6 Organisational Changes**

An Archivist was appointed. New rules for the conduct of Field walks were agreed.

Council records with regret the deaths in the past year of Dr R. (Bob) Savage, Dr. L. C. Frost and J. Vine. Legacies have been received with gratitude in the course of the year from all three of these former members.

## GENERAL MEETINGS, 1998

The programme of General lectures for 1998

| | | |
|---|---|---|
| January 25 | AGM and Presidential address. | Richard Bland |
| February 12 | The Severn Bore. | Dr Geoffrey Steele |
| March 12 | Buzzards of the Gordano Valley | Robin Prytherch |
| October 9 | The wetland birds of Azerbaijan | David Painter |
| November 12 | Macaques in Sri Lanka. | Sarah Myles |

## GENERAL FIELD MEETINGS, 1998

These meetings were organised by the Field Committee, whose members were: Chairman – Miss S. M. Garden, Hon. Secretary – Miss R. C. Lee, Committee members – Mr D. A. Cullen, Miss S. M. McCarthy and Miss M. B. Morris. The following meetings were held under the leadership of those indicated:

| | |
|---|---|
| 7 Mar. | Miss S. Garden. Kew Gardens. This was a very rewarding visit. There was a fine show of daffodils and a carpet of crocuses which were not quite over. In a marvellous orchid festival, there were flowers from many countries. |
| 10 Apr. | Miss R. Lee. Selworthy and Horner. Although the weather was wet for most of the time, this was an interesting meeting. By Horner Water we saw some spring flowers and a few woodland birds. |
| 9 May | Mrs E. Lloyd. The Montacute area. Our guide was a local naturalist, who led us round the gardens and grounds of Montacute House and then on through woodland and fields on the edge of the village. We saw many spring flowers and heard a number of common birds. |
| 20 Jun. | Miss S. Garden Kingsbury Waterpark, Warwickshire. This was a very enjoyable visit to a new venue, which is a veritable bird-watching paradise. We saw many birds and flowers. |
| 25 Jul. | Miss M. Morris. The Pewsey area, Wiltshire. We made a morning visit to the Knapp Hill and Pewsey Downs nature reserve where we saw many flowers of chalk grassland. In the afternoon we went to a reserve of the Wiltshire Wildlife Trust, near Pewsey where two of the wardens gave us a guided walk round wet meadows and bogs; these support many flowers of interest. |
| 5 Sep. | Miss S. McCarthy. The Forest of Dean. We had a walk from Wench Ford through part of the forest. Here there were many woodland fungi and other plants and we saw a few birds and some butterflies. In the afternoon we visited the Dean Heritage Centre. |
| 3 Oct. | Mr D. Cullen. The Solent Way. We had lovely weather for this walk along the Way, by the Keyhaven and Pennington marshes. We saw 59 species of birds including a rarity, the Grey Phalarope. |
| 7 Nov. | Miss R Lee. The Forest of Dean. We re-visited the Sculpture Trail to see the various exhibits which have been made from material connected with the forest and its mining history. The autumn colours were still well in evidence. |

RACHEL C.LEE, *General Field Secretary*

## REPORT OF THE BOTANICAL SECTION, 1998

At the Annual General Meeting held on 19 January, officers and Committee Members were elected as follows:- President: Mr A. C. Titchen, Hon. Secretary/Treasurer: Mr C. W. Hurfurt, Committee members: Mrs C. Kitchen, Mr M. Kitchen, Mrs P. Millman, Mr A. G. Smith, Mr L. Taylor, Mrs H. Titchen and Mrs M. Webster. This left the Committee unchanged from 1997 and still with several vacancies. The following indoor meetings were held:-

| | |
|---|---|
| 19 Jan. | Annual General Meeting, followed by the Presidential Address: "A botanical trip to the Italian Dolomites" by Tony Titchen. |
| 9 Feb. | "British Primula variants" by Margaret Webster. |
| 23 Mar. | Short-notice programme of members' contributions which replaced a lecture cancelled because the speaker was ill. |
| 26 Oct . | Members' Evening of talks and exhibits. |
| 23 Nov. | "Systematic Biological Recording", by Dr T. Rich. |
| 28 Dec. | "Mistletoe biology and the National Survey results" by Jonathan Briggs. |

This year we noted a drop in attendance at indoor meetings to an average of around 25 members.

The following outdoor meetings were held, led by those indicated:

| | |
|---|---|
| 8 Mar. | The Spring Snowflake site at Crowcombe, Tony Titchen. |
| 4 Apr. | Goblin Combe, Tony Smith. |
| 25 Apr. | Crook Peak, Tony Titchen. |
| 5 May | Avon Gorge, Pam Millman. |
| 15 May | Visit to see a Medlar at Portishead and another at Clevedon, Tony Titchen. |
| 16 May | Visit to see limestone flowers at Sand Point, Diana Maxwell. |
| 4 Jun. | Arboretum in the garden of Churchill Hall, University of Bristol, Tony Titchen. |
| 7 Jun. | Redding Pits at Winford, Margaret Webster. |
| 13 Jun | Kilve and surrounding area, Diana Maxwell. |
| 18 Jul. | The Frome Valley Walkway, Chris Hurfurt. |
| 28 Jul. | Round and about Blaise Castle House and Henbury churchyard, Tony Titchen. |
| 9 Aug. | Merring Meend, Forest of Dean, to record for the Atlas 2000 Project, Clare and Mark Kitchen. |
| 5 Sep. | Veteran Yew Tree Car crawl, Tim Hill and Tony Titchen. |
| 6 Sep. | Black Rock and Velvet Bottom, Liz McDonell. |

Numbers at outdoor meetings varied, as in previous years, but the leaders were generally satisfied with the attendance.

CHRISTOPHER W. HURFURT, *Hon. Secretary*

## REPORT OF THE GEOLOGICAL SECTION, 1998

At the Annual General Meeting, held on 14 January, Mr D. Cope was re-elected as President. Dr E. Cook was elected as Hon. Secretary, Mr P. C.Stevenson as Hon. Treasurer, and Mr S. C. Carpenter was re-elected as Hon. Field Secretary. Members re-elected to the Committee were Mrs M. E. Poolman, Mr D. W. Strawford and Mr D. A. Wilson.

The following indoor meetings were held:

| | |
|---|---|
| 14 Jan. | Annual General Meeting and Presidential Address, "A geologist in central and south Wales" by Mr D.W. Cope. |
| 11 Feb. | "Dinosaur expedition to Canada" by Mr S. C. Carpenter. |
| 18 Mar. | "Dinosaurs and other animals from south east England" by Dr E. Cook. |
| 17 May | "Behind the scenes at Oxford University Museum", leader - Mr P. Powell |
| 14 Oct. | "Looking for sea dragons in the desert" by Mr S. C. Carpenter. |
| 7 Nov. | Annual Reunion of the Geologists' Association in London. |
| 18 Nov. | "Environment and evolutionary history of the earliest vertebrate land predators" by Dr I. Jenkins. |
| 9 Dec. | Members' Evening with four short presentations and identification of members' specimens. |

The following outdoor meetings were held, led by those indicated:

| | |
|---|---|
| 18 Apr. | Wickwar and Quartzite Quaries, Mr M. Mitchelmore. |
| 17 May | "Behind the scenes at Oxford University Museum", leader - Mr P. Powell. |
| 16 Aug. | "Geology on a bicycle" - rocks of the Bristol to Bath Railway Path, Mr S. C.Carpenter and Mr R. J. B. Smith. |
| 20 Sep. | The geology of Clevedon, Mr C. J. T. Copp. |
| 11 Oct. | Geological site clearance project on Lower Jurassic Section at Keynsham, Mr S. C. Carpenter and Mr A. Bentley. |

The Section enjoyed an excellent Field Season. Several excursions were joint ventures with Bath Geological Society. Members enjoyed a superb day looking at the varied geology of Clevedon, led by Charles Copp, an enthusiastic biologist and geologist. A site clearance project at Keynsham, near Bristol, gave members the opportunity to get their hands dirty, restoring a section of Lower Jurassic rocks. Members of our Society and of Bath Geological Society are thanked for supporting the field excursions throughout the year.

SIMON C. CARPENTER, *Hon. Field Secretary*

## REPORT OF THE ORNITHOLOGICAL SECTION, 1998

At the 74th Annual General Meeting, held on 23 January, Mr R. L. Bland was re-elected as President, for the final year of his three-year term of office. Dr M. J. Hill was re-elected as Hon. Secretary/Treasurer. Committee members: Mr P. J. Chadwick, Mr B. M. J. Gray, Mr M. J. Haines, Mrs J. Lance, Miss S. McCarthy and Dr H. E. Rose were re-elected and Mr D. A. C. Cullen and Mr P. R. A. Kelly were elected and joined the Committee.

The following indoor meetings were held:

| | |
|---|---|
| 23 Jan. | Annual General Meeting, followed by the Presidential Address: "The Avon Winter Garden Bird Survey". |
| 11 Feb. | "Bristol's Peregrines and Pigeons", by Mr J. Tully. |
| 6 Mar. | "Bird migration - how do they do it?" by Professor C. Pennycuick. |
| 9 Oct. | "The wetlands of Azerbaijan" by Mr D. Paynter, (a joint Ornithological/General lecture). |
| 6 Nov. | "Birds in Art" by Mr K. Taylor. |
| 16 Dec. | "Illegal poisoning of wildlife" by Mr P. J. Hancocks. |

The following field meetings were held, led by those indicated:

| | |
|---|---|
| 24 Jan. | Slimbridge Wildlife and Wetlands Trust, Mr D. Paynter. |
| 8 Feb. | River Exe boat trip, Mr M. J. Haines. |
| 28 Mar. | Brean Down, Mr B. M. J. Gray. |
| 23 Apr. | Sand Point, Mr R. L. Bland. |
| 26 Apr. | Clevedon Sea Wall, Dr H. E. Rose. |
| 6 May | Weston Moor, Mr L. Roberts. |
| 14 May | Chew Valley Lake, Mr D. Warden. |
| 20 May | Folly Farm (Avon Wildlife Trust reserve) Mr D. Warden. |
| 28 May | Spaniorum Hill, Mr R. L. Bland. |
| 6 Jun. | Blaise Woods, Mr J. Tully. |
| 18 Jun. | Eastwood Farm & River Avon boat trip, Mr B. M. J. Gray. |
| 27 Jun. | Went Wood, Miss S. McCarthy. |
| 12 Sep. | Slimbridge Wildlife & Wetland Trust, Mr D. Paynter. |
| 10 Oct. | Clevedon Sea Wall, Dr H. E. Rose. |
| 14 Oct. | Westhay Moor, Mr R. L. Bland. |
| 29 Dec. | Chew Valley Lake, Mr P. Farmer. |

During the year, members have participated in a number of local field surveys. These were the Winter Garden Survey (25th year), the Overwintering Warbler Survey, the Rookery Survey, a count of eight heronries, the Breeding Bird Survey, the Tetrad Breeding Bird Survey (2nd year) and the survey of birds breeding in gardens. Members helped to maintain the Peregrine Watch.

National surveys to which members contributed were the Common Bird Survey, the House Martin Survey, the Waterways Bird Survey, the Lapwing Breeding Survey and the BTO Garden Bird Survey.

MARY HILL, *Hon. Secretary*

## REPORT OF THE MAMMAL GROUP 1998

During the year fieldwork included:-

| | |
|---|---|
| 21 Jun | Bat Box Survey at Chew Valley and Blagdon Lakes - a joint meeting with the Avon Bat Group |
| 6-8 Nov | Small mammal trapping, part of the National Yellow-necked Mouse survey. |

Unfortunately there were no indoor meetings held in 1998.

Mammal records continued to be collected and are summarised in The Avon Mammal Report in this issue.

DAVID TRUMP, *Secretary, Mammal Group*

## REPORT OF THE INVERTEBRATE GROUP 1998

Tony Smith continued to act as Convener for meetings, and the following indoor meetings were held:-

| | |
|---|---|
| 7 Jan | Development of novel pest control techniques, by Dr Richard Wall. |
| 21 Feb | Behind the scenes at the Zoo, by Dr B Carroll. |
| 19 Mar | New Forest butterflies by Matthew Oates. |
| 4 Nov | Bristol Regional Dragonfly recording group, by Steve Preddy. |
| 5 Dec | Books behind the scenes at the City Museum. By Ray Barnett. |

The following field meetings were held:-

| | |
|---|---|
| 16 May | Beekeeping, Brian Steadman |
| 9 Jun | Sneyd Park, Tony Smith |
| 12 Jul | Wetmoor, Ray Barnett |
| 19 Jul | Thornbury NNR by Ray Barnett |
| 2 Aug | Avon Gorge, the Gully, Martin Evans |

RAY BARNETT. *Secretary Invertebrate Group*

## REPORT OF THE PUBLICATIONS COMMITTEE 1998

The members of the Committee for this year were:- Dr H. E. Rose (chair), Mr. R. J. Barnett, Dr K. Crabtree, Dr M. H. Martin, Mr P. Stevenson, Mr R. G. Symes, Mr S. M. Taylor, Mr D.P.C.Trump, (ex officio, the Society's Hon. Publicity officer), and Mrs A. F. Hollowell (Hon Editor, Proceedings). The Committee met three times during the year.

The BNS Special Issue No 4 "The Mendip Hills", published with the corresponding issue of the *Proceedings*, Vol. 55 (for 1995) in late 1997, continued to sell, and was well received. However, most regrettably the copy sent to the printers was subsequently found to have contained many typographical errors. The Hon. Editor, at whose door the responsibility lay, wishes to express her profound apologies to the members of the Publications Committee and to all the authors concerned. She also apologises to Dr Simms for the omission of two photographic illustrations from his paper on the geology of the Mendips. In view of this situation the Committee agreed to the preparation of a comprehensive correction sheet also including the missing geological photographs. This would be published as part of the issue for 1996 but extra copies would be printed and supplied to those non-members who had bought copies of the special issue and also to libraries that subscribe to the *Proceedings*.

The Special Issue has been selling at a steady rate and in a number of cases an initial sale has been followed by another order from the same individual requesting further copies. The Mendip Society, which provided generous financial support for the production of the issue, received a consignment of copies at cost price for resale to their members and others.

Currently about a dozen libraries and other institutions subscribe to the Proceedings and about 40 copies are also sent out in exchange for serials which are added to the stock of the Society's library each year. In addition one copy is also supplied to each of the five Deposit (copyright) Libraries in the U. K. and one in the Irish Republic.

During the year work continued on the preparation of copy for the 1997 Proceedings and preliminary work is being undertaken for the issue for 1998.

At the end of the year the Committee stood to lose a member with many years of service, who will not be standing for re-election. Mr S. M. Taylor has been a member of the Committee since 1974. Over the years he has seen two issues of the Proceedings to the printers, greatly assisting the Hon. Editors of the day when circumstances prevented them from completing the work themselves. Since 1991 Mr Taylor has each year undertaken the onerous task of preparing the camera-ready copy of the *Proceedings* for the printer, which has helped to keep production costs within reasonable bounds. Recently he has also put in a great deal of work on preparing an index to the Proceedings, covering the period from

1971 to 1995, and this will appear in the issue for 1996. Committee members tender their sincere thanks to Mr Taylor for his contribution to, and support of, the work of the Committee throughout his term of office, which reflected not only his dedication, but also his wide experience of editorial work both nationally and within the Society's Ornithological Section, and for the Avon Bird Report.

The Hon. Editor would like to express her thanks to the Chairman and members of the Committee for their help and support during the year and Committee members also thank Dr Crabtree for providing a venue for their meetings.

ANNE HOLLOWELL, *Hon. Editor*

## REPORT OF THE LIBRARY COMMITTEE 1998

Mrs. A. F. Hollowell was re-elected as Honorary Librarian. The Library Committee was chaired for 1998 by Roger Symes and met on five occasions during the year. Members of the Committee continued to staff the Library from 12.30 to 1.30 pm on Wednesdays, and from 10.15 am to 12.00 noon on Saturdays. During the year 31 (44 in 1997) members made 254 (269) visits and borrowed 213 (260) items. In addition there were 2 (9) visits by Museum staff. These figures do represent a slight decline compared with the previous year.

One book was purchased and 34 books, 233 issues of journals, and 82 pamphlets and offprints, which had been donated, were accepted into the library stock. For all these we are indebted to:-

Mr P. S. H. Boyce, Dr. R. Bradshaw, Dr C. Grant, Estate of Mr. H. R. H. (Steve) Hammacott, Mrs. A. F. Hollowell, Mrs S. P. Kelly, Dr J. McOmie, Mrs B. Price, Estate of Miss E. J. Vinicombe, Prof A. J. Willis, Mr. D. A. Wilson and Mr L. S. Wyatt. Special name-plates are added to books given to the collection by members. 29 journals were received by subscription. 45 were received by exchange and 11 journal runs were received as gifts.

At the end of the year Mr. S. M. (Mike) Taylor resigned from the Library committee after serving a total of 25 years of very active membership. The grateful thanks of the Committee and indeed of the whole society go to Mike for all that he has done for the library since 1974. All members of the Committee are thanked for their contributions during 1998.

The Society thanks Mr. Stephen Price, Head of Museum and Leisure Services, Bristol City Council, for the continued use of the Library room and for the assistance given to members during the year by Museum staff, and welcomes the continued use made of the Library by Museum staff.

ROGER SYMES *Chairman, BNS Library Committee*

OBITUARY

## ROBERT J. G. SAVAGE (1927-1998)

Robert (Bob) Savage, Professor of vertebrate Palaeontology at the University of Bristol, died of cancer of the pancreas on may 9 1998, aged 70. He was a long-term supporter of the Bristol naturalists' Society, and had served it in various ways since the 1950s.

Bob Savage was a leading expert on fossil mammals, best known for his work in Africa, and something of a raffish gentleman explorer. He began his work in Africa in 1955, working first with Louis Leakey, and latterly with his son Richard, and daughter-in-law, Meave Leakey. The Leakeys focussed their attention on the early human remains, but they gathered around them experts on other fossils from the sites. Bob took part in many expeditions in Kenya and Tanzania, and published extensively on the fossil carnivorous mammals of the hominid sites.

Bob was bitten by the Africa bug after this early initiation, and he published accounts of fossil mammals from Uganda, Congo and especially Lybia. He and his students in the 1960s would drive to Lybia from Bristol in Bob's landrover. The journey took three days and nights of continuous driving, through France and Spain, across to morocco from Gibraltar, and then to Lybia via Algeria and Tunisia. Bob and his colleagues focussed their attention on the Gebel Zeltan fauna of southern Lybia, as assemblage of mammals dating from the Miocene, a time twenty million years ago when North Africa was lushly forested. Bob wrote several monographs on the fauna, part of a series published by the British Museum (Natural History), and his account of *Megistotherium*, a giant flesh-eating hyaenodont with a skull over a metre long, is a classic.

Bob Savage's work on African mammals found another focus in an influential series of volumes, which he co-edited with Louis Leakey, and other collaborators, on the 'Fossil vertebrates of Africa' in the 1960s and 1970s. His expeditions were not restricted to Africa, and he led successful expeditions to Iran (then Persia), Israel, India, Pakistan, Russia and Australia. In 1991, on his retirement, he drove from Pakistan to Beijing, across the Himalayas, as a diversion, and later that year, visited Tierra del Fuego.

Bob was born in Northern Ireland on 2nd July 1927, a member of an old Ulster family that held sway in the southern part of the Ards peninsula, County Down. He recalled a massive set of antlers of the great Irish deer *Megaloceros* mounted on a wall of the entrance hall to the family pile. Bob was educated at Methodist College, Belfast, and at Wesley College Dublin, but he did not maintain a Methodist or protestant faith, becoming a humanist in his adult years. Bob graduated with a double undergraduate degree, a BSc in zoology in 1948 and a first class BSc in geology in 1949, from the Queens University of Belfast. He

worked for his PhD from 1950 to 1952 at University College London under Professor D. M. S. Watson, the doyen of British vertebrate palaeontology at the time.

Bob's first academic position was as assistant lecturer in the geology department at the Queen's University of Belfast in 1952. There he worked with the great expert on the Irish Pleistocene, Professor Charlesworth, and was involved in the move of that department into a new purpose-built edifice. Bob soon moved to Bristol in 1954, as a Lecturer and Curator of the collections in the Department of Geology. He was promoted to a Readership in 1966 and to a Personal Chair in Vertebrate Palaeontology, in 1982.

Bob maintained a broad interest in local geology, first in Ireland, and then in the south west of England. He became deeply interested in the very early Mesozoic mammals of the Bristol area, and, further afield, on Skye. These local geological interests extended to the history of science: he was an avid collector of early geological and natural history books, and he published on the history of geology.

Bob's interest in Mesozoic and Quaternary geology soon led him to the Bristol Naturalists' Society, which he joined in January 1955. He was elected as Honorary Secretary of the Geological section in 1956, a position he held until 1958, and he continued as a member of the committee of that section from 1959 until 1965. He was Vice-President of the Society in 1960-1961, and President 1963-1964. In April 1960 Bob led a field trip of the Geological Section to the Bridgewater area including the Burtle Beds.

In 1965 Bob was active among those discussing the formation of a Mammal Section, which came into being in February of the following year. In November 1966 he gave a lecture on 'The evolution of Man' to a joint meeting of the Geological and Mammal sections. In 1967 he became president of the Mammal Section, and gave his Presidential address on 'Rhinogradentia- a fictitious order of mammals'. He gave a further talk to the Section on October 1970 on 'Desert mammals'. He became a committee member of the Mammal Section in 1972 and continued to be re-elected up to 1978.

Bob continued to support both sections in the 1970s. He gave a lecture on 'Geological problems in a developing country' in February 1970, and led a geological field trip to the Wren's nest, Dudley, in July 1972. He spoke on 'The Gregory reef' in March 1976. In May 1979 he took members of the Geological Section on a walk to look at the 'Building stones of Clifton', a subject on which he gave a talk in November 1995, and led a further evening walk in June 1996. He published a number of papers in the society's *Proceedings* one of them to be published posthumously (Savage, 1957, 1961, 1970, 1988, 1998, Savage and Waldman 1965).

Bob's talks and field-trips were always meticulously prepared, his talks delivered generally without notes, or with only minimal prompts, well illustrated with colour slides and drawings, and given in a relaxed friendly manner. His erudition and depth of knowledge in geology, palaeontology, zoology and the history of science were clear, but he was always willing to discuss anything with anyone, and to make sure that he was understood. Bob was endlessly helpful to scholars young and old, and boyishly enthusiastic about matters geological and historical. He had a patrician air, and was full of stories of the great and the good. He was an amusing raconteur, whose tales, admittedly, improved with the telling.

Bob made enthusiastic efforts in educating new generations of palaeontologists. In 1968, he began a Joint degree in Geology and Zoology in Bristol, and this programme flourishes to the present day. It is widely recognised as a training ground for keen young palaeontologists, and a remarkable number of its graduates have gone on to successful academic careers. This always made Bob inordinately proud, and he kept continuous contact with his former students. He supervised 17 PhD students, mainly working on fossil mammals, British and African. Among his popular works Bob edited an excellent field guide to the geology of the Bristol area published in 1977, and contributed to numerous popular works in palaeontology and geology. His greatest joy was his book 'Mammal evolution', published by the British Museum, (Natural History) in 1968, richly illustrated with colour paintings by Michael Long. This book is referred to as 'Savage and Long', an addition to a paper published by Bob and his local colleague Nick Large in 1966, namely 'Savage and Large'

Latterly Bob extended his interests to historic gardens and he studied formal gardens of stately homes large and small in the Bristol area. He served on local committee of the National Trust and was Chairman of their Committee on Stag Hunting in 1992 and 1993.

He sat on the Council of Bristol Zoo from 1984 to 1989, and this apparently gave him access to recently deceased exotica. Some of the carcasses found their way to his dissecting bench, others into his kitchen. He once sampled some hippopotamus steak, and, on being asked what it tasted like, reported "well, something like Okapi."

Bob married Dr Shirley Coryndon in 1969, but she died in 1976. He is survived by his step-daughters Anna and Virginia.

References.

Savage, R.J.G. 1957 Pliosaur from Portland. *Proceedings of the Bristol Naturalists' Society*, **29**, 379-380.

Savage, R.J.G. 1961 Rhaetic exposure at Emborough. *Proceedings of the Bristol Naturalists' Society*, **30**, 275-278.

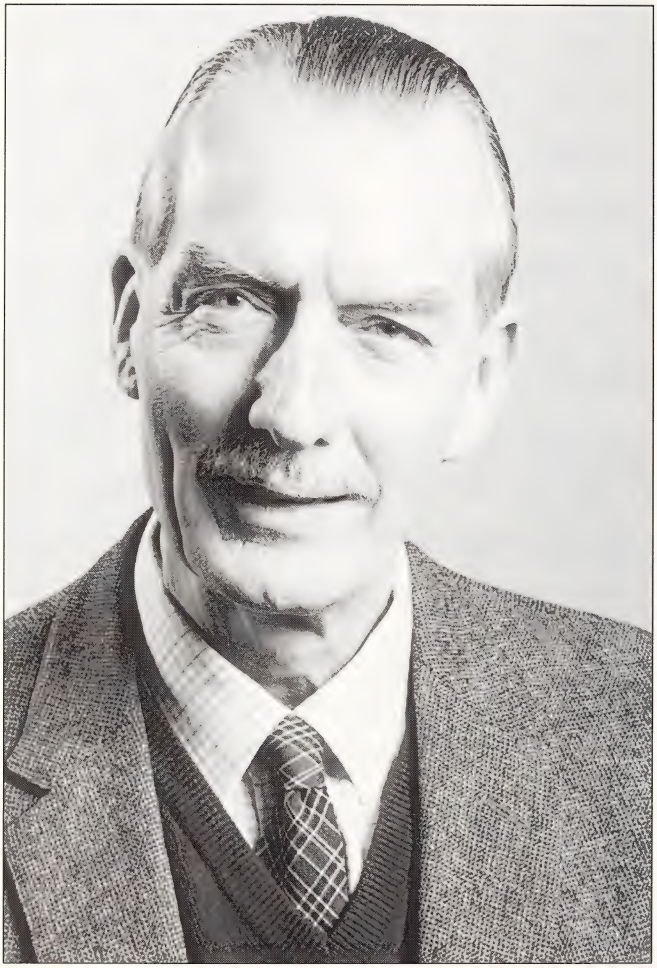
Savage, R.J.G. 1970 Trilodont *incertae sedis*. *Proceedings of the Bristol Naturalists' Society*, **32**, 80-83.

Savage, R.J.G. 1988. Building Stones of Clifton *Proceedings of the Bristol Naturalists' Society*, **48**, 84-104.

Savage, R.J.G. 1998 Mines and quarries of Clifton, Bristol. *Proceedings of the Bristol Naturalists' Society*, in press.

Savage, R.J.G. and Waldman M. 1965 Oligokyphus from Holwell Quarry, *Proceedings of the Bristol Naturalists' Society*, **31,** 185-192.

MICHAEL BENTON



**R. J. G. SAVAGE**

## THE SOCIETY'S ACCOUNTS FOR 1997

The delay in producing the Society's Accounts for 1996 was explained in the previous Proceedings. The Accounts for 1997 are presented in this issue and include for the first time the monies held by Sections. This is to meet the requirements of the Charity Commission that all funds held by charitable organisations are revealed. The Hon. Treasurer is hopeful that the Society's published accounts will be up to date by the next issue of the Proceedings. He is most grateful for the considerable support and advice given by the Society's Hon. Auditor Mr. Trevor Silcocks.

## NOTES FOR THE ACCOUNTS FOR 1997

1) For the first time the balances held by Sections are included, albeit in summary. Full details are available from the Hon. Treasurer.
2) The merger of various funds to form the Memorial Fund was announced in the 1996 Accounts. Readers are referred to those published accounts for an explanation of the 1996 position.
3) Grant from the Conservation Fund was to the Diane Fossey Gorilla Fund.
4) The Hector Hockey Memorial Fund is an endowment fund. The capital is represented by £5000 Income Bonds, and £40.63 in the National Savings Ordinary Account. Only the interest gained from this fund may be given in grants.
5) The Milton Fund is an unrestricted fund which Council uses particularly to provide additional support to the Hockey Fund.
6) The Library Fund originated in 1995, and is devoted to Library expenditure.

Signed:

R.G. Symes *Hon. Treasurer* 31/12/99

T.B. Silcocks *Hon. Auditor* 31/12/99

## BRISTOL NATURALISTS' SOCIETY

STATEMENT OF ACCOUNTS, 1997

| 1996 GENERAL FUND | INCOME | 1997 GENERAL FUND | 1997 SECTION FUNDS | 1997 TOTAL |
|---|---|---|---|---|
| | **Voluntary Sources** | | | |
| 5034 | Subscriptions | 5226 | | 5226 |
| 22 | Donations | 217 | 91 | 308 |
| | **Trading Activities** | | | |
| 150 | Proceedings Sales | 0 | | 0 |
| 36 | Library Sales | 51 | | 51 |
| | **Income from Assets** | | | |
| 752 | Bank Interest | 1045 | 28 | 1073 |
| | **Miscellaneous Receipts** | | | |
| 333 | Field Committee surplus | 0 | | 0 |
| 64 | Social Evening Income | 175 | | 175 |
| | Miscellaneous income | 22 | 23 | 45 |
| 6391 | **TOTAL INCOME** | 6736 | 142 | 6877 |

| 1996 GENERAL FUND | **EXPENDITURE** | 1997 GENERAL FUND | 1997 SECTION FUNDS | 1997 TOTAL |
|---|---|---|---|---|
| | **Direct Charitable Expenditure** | | | |
| 557 | Meetings | 684 | 263 | 948 |
| 549 | Library | 571 | 10 | 581 |
| 862 | Proceedings and Avon Bird Report | 3793 | | 3793 |
| 1819 | Bulletin Printing (and Distribution in 1996) | 1053 | | 1053 |
| | Publications distribution (1997) | 1080 | | 1080 |
| | Donations to other Organisations | 55 | | 55 |
| 19 | Subscriptions to other Organisations | | 19 | 19 |
| | **Other Expenditure** | | | |
| 294 | General Printing and Stationery | 528 | | 528 |
| 151 | General Postage and Telephone | 89 | | 89 |
| 28 | Bank Charges | 34 | | 34 |
| 10 | Subscription refund | 73 | | 73 |
| 100 | Miscellaneous (Incl. Social Evening) | 259 | 73 | 332 |
| | Public Liability Insurance | | 26 | 26 |
| 2002 | Surplus/-Deficit for year | -1482 | -249 | -1731 |
| 6391 | **TOTAL EXPENDITURE** | 6736 | 141 | 6877 |

## BRISTOL NATURALISTS' SOCIETY ACCOUNTS 1997

BALANCE SHEET as at 31st December 1997

| 1996 | ASSETS | 1997 |
|---|---|---|
| 10000 | National Savings Income Bonds | 10000 |
| 2170 | National Savings Ordinary Account | 2742 |
| 27005 | Cash at Bank - General Accounts | 24371 |
| 239 | -Section Accounts | 530 |
| | Building Society Deposits | 970 |
| | Cash in Hand | 8 |
| 357 | Prepayments | 96 |
| -2367 | Less Creditors - Advance Subs.1998 71.50 | -352 |
| | - Proceedings 280.00 | |
| **37404** | **TOTAL** | **38365** |

| 1996 | REPRESENTED BY | 1997 |
|---|---|---|
| | **General Fund:** | |
| 6958 | General Fund Balance at 31st December 1996 | 8960 |
| | Section Funds at 31st December 1996 | 1217 |
| 2002 | Surplus (-Deficit) on Year | -1731 |
| | **Special Funds:** | |
| 13377 | *Memorial Fund* | 14889 |
| 110 | *Conservation Fund* | 75 |
| 7001 | *Hector Hockey Endowment Fund* | 6662 |
| 5070 | *Milton Fund* | 5406 |
| 2886 | *Library Fund* | 2886 |
| **37404** | **TOTAL** | 38365 |

## BRISTOL NATURALISTS' SOCIETY ACCOUNTS 1997

SPECIAL FUNDS

| 1996 | RECEIPTS AND PAYMENTS DURING THEYEAR | 1997 |
|---|---|---|
| | ***Memorial Fund.*** | See notes re. 1996 |
| | Balance at 31st December 1996 | 13377 |
| | Bequests received in 1997: | |
| | Estate of Miss IF Gravestock | 1000 |
| | Estate of Miss T Martin | 500 |
| | Donations received in 1997 | 12 |
| | LESS Grants made in 1997 | 0 |
| | Memorial Fund balance at 31st Dec. 1997 | 14889 |
| | ***Conservation Fund*** | |
| 236 | Balance at 31st December 1996 | 110 |
| 24 | Donations received in 1997 | 25 |
| -150 | LESS Grants made in 1997 | -60 |
| 110 | Conservation Fund balance at 31st Dec.1997 | 75 |
| | ***Hector Hockey Memorial Fund*** | |
| 5041 | Endowment capital (Income Bonds and £40.63 Nat. savings) | 5041 |
| 711 | Balance of income at end of 1996 | 1960 |
| 324 | Investment income 1997 | 306 |
| 24 | National savings income 1997 | 30 |
| 1000 | Replacement of income 1996 | 0 |
| -100 | LESS Grants taken up in 1997: | |
| | Funding of paper in Mendip Hills Special Issue | -300 |
| | S. Carpenter for Interpretation Boards | -175 |
| | J. Tully for BTO Recording | -200 |
| 7001 | Hockey Fund balance at 31st Dec. 1997 | 6662 |
| | *Hockey Fund income c/f to 1998* | 1621 |
| | ***Milton Fund*** | |
| 1000 | Capital (Unrestricted) (Income Bonds) at 31st Dec. 1997 | 5000 |
| 0 | Balance of income at end of 1996 | 70 |
| 4000 | Transfer from Memorial Fund (1996) | |
| 65 | Investment Bond income 1997 | 306 |
| 5 | National Savings Income 1997 | 30 |
| 0 | LESS Grants made 1997 | 0 |
| 5070 | Milton Fund balance at 31st Dec. 1997 | 5406 |
| | *Milton Fund income c/f to 1998* | 406 |
| | ***Library Fund*** | |
| 3300 | Balance at 31st Dec. 1996 | 2886 |
| -414 | Expenditure from Library Fund in 1997 | 0 |
| 2886 | Library Fund balance at 31st Dec. 1997 | 2886 |

## ADVICE TO CONTRIBUTORS

The editor welcomes original papers on the natural history of Avon and surrounding areas for consideration for publication in the *Proceedings*. Inexperienced authors may obtain advice from members of the Publications Committee. Authors should bear in mind that their readers will not usually be specialists in the particular subject, and that unnecessarily technical language can be a barrier to understanding.

All PAPERS for consideration should reach the editor by the end of August in each year. If there is likely to be a problem with this target date please contact the editor in advance. All SOCIETY REPORTS etc should reach the editor by the end of February in the next year.

Manuscripts should be double-spaced with wide margins and on one side of the paper only. The author should retain a copy. The wording should follow the style and format of the Proceedings. Abbreviations should not normally be used, especially in the abstract. An abstract should be supplied, and the text should be broken up by appropriate headings and sub-headings, and accompanied by relevant illustrations. Captions to illustrations should be given separately at the end of the text.

Originals, not copies of photographs, slides, line drawings, diagrams and maps should be submitted- returnable on request. Drawings and other diagrams should not be more than twice final size and made in black medium. Photographs and slides may be submitted as prints, positives or negatives, preferably in monochrome. Graphs, charts and simple diagrams may most readily be produced by computer graphics: advice and help with this are available.

References should be listed at the end of the text in alphabetical order of the first author's name, and should take the following form.

**Book:** AUTHOR (DATE). *Title*. Place of publication: Publisher. E.g.
RACKHAM, O. (1986). *The history of the countryside*. London: J.M.Dent.

**Paper:** AUTHOR (DATE). Title. *Journal name*, **volume** (part),page nos. E.g.
ROSS, S. M. & HEATHWAITE, A. L.(1986). West Sedgemoor: its peat stratigraphy and peat chemistry. *Proceedings of the Bristol Naturalists' Society*, **44,**19-25.

It is very helpful if the text can also be submitted on a disk either as an ASCII file or as a formatted file produced by any well-known software. This is especially valuable where many scientific names are involved.

The **copyright** of all published material will belong to Bristol Naturalists' Society, whose council may authorise reproduction.

*Proceedings of the Bristol Naturalists, Society* (1998), **58**:24-38

# BRISTOL MAMMAL REPORT 1998

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Windrush, West End Lane, Nailsea, BS48 4DB

## INTRODUCTION

This is the tenth recent mammal report for Bristol and its surrounding districts. It is intended to be a wide-ranging review of the records and studies of mammals in and around the Bristol area in 1998. The numbers of 1-km squares in which the mammals were recorded in are shown in brackets after the scientific name. All grid references are for the region "ST" as defined by Ordnance Survey. The bold figures are those indicating the 10 kilometre square.

It is hoped to produce a Mammal Atlas for the Bristol area and so all records of mammals are being collected. It is likely that the atlas will be based on 1-km square records (i.e. a four figure grid reference) but records with six figure grid references are preferred.

## Weather News (summarised from British Wildlife Magazine)

1998 was another record year, the 8th warmest year this century for England and Wales. The year started with some exceptional weather with warm days more typical of late spring, and gales and torrential rain. Storm force winds of over 100mph were recorded in late January in the South West of England. February in comparison was mild and unusually dry. The 1997/1998 winter was one of the ten mildest winters on record. Unsettled weather continued during the spring with mild weather but exceptional rainfall just before Easter resulting in floods especially in the Midlands. It was the wettest April since 1818. May sunshine was a rare but welcome sight before it rained and rained in June, which had almost twice as much rainfall as normal. The summer was generally unsettled although statistically it was not far from the norm. Western regions had above normal rainfall. The hoped for "Indian summer" never occurred in the autumn as there was more mild, wet weather. The year ended with unexceptional weather and the usual mild but wet Christmas.

## INSECTIVORA (hedgehogs, shrews, and moles)

**Hedgehog** ***Erinaceus europaeus*** *(57)*
There were 87 records from the following 1-km squares: **3056**, **4257**, **4862**, **4675**, **5158**, **5064**, 5470, 5476, 5671, 5677(2), 5679, 5770(3), 5771(3), 5776, 5777(3),

5778(2), 5779, 5876(2), 5877, 5878, 5977, 5978(2), **56**80, 5788, **63**56, 6458, 6556, **62**62, 6361, 6463, 6568, 6569, 6767(2), 6867, **60**75, 6174, 6275, 6278, **61**84, 6388(4), 6489(7), 6589(3), 6780(2), **63**90(2), 6490(3), 6491, 6590, **71**63, 7164, 7263(2), 7462, 7660, 7668, 7272, 7675, **70**81, 7082, 7282. Of the 88 records, 71 were of road casualties, 2 were found dead after hibernation and the remainder were either live sightings or were unspecified.

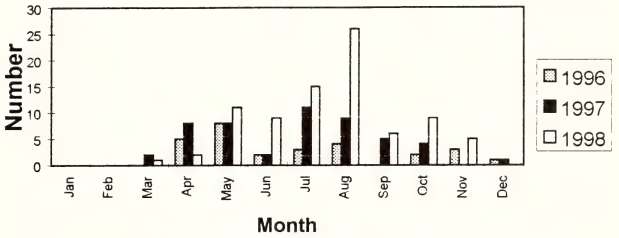


Figure 1. Number of Hedgehog Records per Month 1996-1998

Unlike 1996 and 1997 (Figure 1) there were no records for December when it is expected that most hedgehogs are hibernating. June was a 'quiet month' for hedgehog in 1996 and 1997. There were a few more seen in 1998 although still not as many as May or July. The reasons for this are unclear. There were a relatively large number of hedgehog records for August in 1998.

(Records from JA, PJC, CH, DF, SH, MK, JMM, MJM, DN, DP, DPCT, AW.)

**Mole** ***Talpa europea*** (49)

There were 54 records in 1998 compared with 69 records in 1997. This species is very under-recorded and is likely to be much more widespread than records suggest. Records are from all months of the year from the following 1-km squares: **49**59, **40**69, **44**76, 4576(2), 4671, 4675, **50**56, **52**69, 5564, 5761, **54**70, 5471, 5472, 5478, 5479, 5571(2), 5573, 5670(2), 5678, **62**50, 6251, 6556, 6752, **60**75, 6370, 6377, 6470, 6471, **64**86, 6488, 6583, 7270, 7271, 7370, 7371, 7373, 7374, 7475, 7477, 7572, 7574(2), 7576, 7577, 7672, 7676, 7677, 7976, **76**85, 7789. All detailed 'sightings' were of mole hills. (Records from JB, RLB, PJC, DF, LG, JMi, MJM, AP, DPCT.)

**Common Shrew** ***Sorex araneus*** (10)

Only 4 detailed records although a common and widespread species. Six further records from the BTO surveyors. Records from **30**56, **44**71, 4672, **57**87, **62**50, **77**68, 7576, 7875, **75**81 and **76**84. (Records from MB, PJC, LG, MH, PL, AM, MJM, DN, D & LP.)

Volunteers from the Mammal Society have analysed the remains of over 50,000 small mammals in Barn Owl pellets. They found that there has been a dramatic decline in the numbers of common shrew. It is thought that common shrews require moist conditions and so may have declined due to the recent warm, dry summers. The survival of species such as common shrews have far reaching effects on both mammal and bird predators (Wildlife Reports, *British Wildlife* **10** (3) February 1999).

**Pygmy Shrew *Sorex minutus***
Richard Parker and Stephanie Bull reported on a Longworth trapping survey of the Pygmy Shrew on Lundy in the summer of 1996. They caught and marked a total of 22 individuals in scrub and woodland habitats. The pygmy shrew is Lundy's only surviving terrestrial mammal (they also trapped a juvenile brown rat *Rattus norvegicus*) ('In search of Lundy's Pygmies' Mammal News **114** p.9).

**Water Shrew *Neomys fodiens*** (2)
This is a species that has not been recorded in the Avon Mammal Report for some time. However there were two records in 1998, at 7266, seen in May in a brook in a garden and at 7069, seen in July in a small stream. (Records from AMB and DCG & MM)

**CHIROPTERA (Bats)**

**Greater Horseshoe Bat *Rhinolophus ferrumequinum*** (1)
Unconfirmed report of four or five seen feeding at Blagdon, 5057 (RE).

**Lesser Horseshoe Bat *Rhinolophus hipposideros*** (2)
Records of from 4658 (hibernating) and 7475. (Records from MB and DC.)

**Daubenton's Bat *Myotis daubentonii*** (2)
Ten were seen at Eastville Lake 6175 on 14 May and one at Duchess Pond 6177 on 20 September (both MB). A recent study in the Yorkshire Dales has shown that Daubenton's bats have segregated roosts. A roost of over 60 bats contained solely males with a female nursery roost a few kilometres downstream. It is suggested that management for Daubenton's bats should be at the catchment level to ensure protection of the whole population (Wildlife Reports, *British Wildlife*, **10**(2) December 1998).

**Noctule *Nyctalus noctula*** (5)
Two were seen at Duchess Pond 6177 on 20 September, between 6 and 10 seen at Eastville Lake 6179 on 14 May, 5 seen at St George's Park 6273 on 28 August, one seen at a pub at Emerson's Green 6677 on 30 August (all MB). A noctule was seen overhead in Axbridge 4354 on 11 September (PF).

**Brown Long-eared Bat** ***Plecotus auritus*** (1)
A single one was seen in a stable block at Dyrham Park 7475 on 19 August (MB).

**Pipistrelle** ***Pipistrellus pipistrellus*** (5)
Records of active bats (both phonic types, 45 kHz and 55 kHz) between May and August from 4671 (324 seen coming out of a roof on 22 July and 292 seen on 28 July – see figure 3), 4771, 6179, 6273, 6677. (Records from MB and DPCT.)

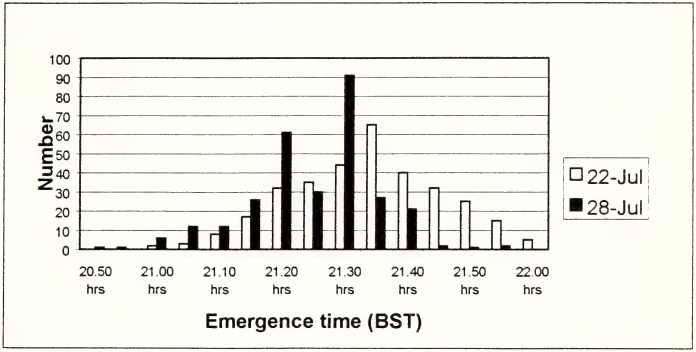


Figure 2. Emergence times of 55 kHz pipistrelles from a house roof in Tickenham.

**Bat Boxes at Chew Valley and Blagdon Reservoirs**
The five groups of bat boxes at Chew, Site 1 (15 boxes) at 579609, Site 2 (14 boxes) at 580608; Blagdon, Site 4 (19 boxes) at 511594, Site 5 (20 boxes) at 510603 and Site 6 (13 boxes) at 512606, were checked twice during the year, in June (by members of the Avon Bat Group), and in October (by Gareth Jones, Bristol University). In June two pipistrelles were found at site 1 at Chew. One was a male and one was a female with a baby. Unlike previous years no bat droppings were found in any of the 81 serviceable boxes. Bird nests were found in a further eleven (1 wren, 3 blue tit, 8 'other/unknown species' or old nests) and a wasps' nest in one box.

In October the boxes at site 1 were again checked. Two boxes contained bats. Three 55 kHz pipistrelles were found in one box (one male and two females) and a single male 55 kHz pipistrelle in another box. Fresh bat droppings were found in a further box. Some of the released bats from the other two boxes flew to this box after being identified.

As before a number of boxes were infested with a range of invertebrates such as woodlice, earwigs, slugs and yellow underwing moths!

**Bat Studies at Bristol University**

Oakeley and Jones (1998) reported on a study of habitat use around maternity roosts by 55kHz phonic type pipistrelle bats. The study area covered west Wiltshire and north and east Somerset. They showed that around the roosts there was significantly more water (especially water edge habitat with woodland or hedgerow on the banks) and continuous hedgerow with emergent trees compared to the habitats around randomly chosen points. Riparian habitats support large numbers of flying insects of the types eaten by 55 kHz pipistrelles and hedgerows may be important linear features used by bats. They concluded that the conservation of these habitats close to maternity roosts would appear to be very important for 55 kHz pipistrelles.

The roosts that formed part of the study are listed below (together with counts of adult females undertaken between 7 and 27 June 1995):

| Number | Grid Reference | Name | Count |
|---|---|---|---|
| 1 | ST 538687 | Barrow | 190 |
| 2 | ST 778677 | Batheaston | 203 |
| 3 | ST 777612 | Limpley Stoke | 320 |
| 4 | ST 787609 | Winsley | 138 |
| 5 | ST 824603 | Bradford-on-Avon | |
| 6 | ST 525583 | Ubley | 335 |
| 7 | ST 343519 | East Brent | 63 |
| 8 | ST 802516 | Beckington | |
| 9 | ST 605325 | Alford | |
| 10 | ST 378184 | Puckington | 165 |
| 11 | ST 314107 | Wadeford | |

**LAGOMORPHA (Rabbits and Hares)**

**Brown Hare** ***Lepus europaeus*** (30)
There were 33 records of brown hares in 1998 from the following 1-km squares: **3**056, 3255, 3258, **3**5**6**6, **4**250, 4253, 4353, **4**570, **5**7**8**7, **6**250, **6**3**6**7, 6665, 6760, 6761, 6763, 6765, 7**3**56, 7659(2), 7**0**6**5**, 7569, 7**3**74, 7375, 7474, 7572, 7574 (2), 7577, 7677, 75**8**5, 7685(2), 7986. A further record was received of a brown hare seen in the Gordano Valley near Walton-in-Gordano, unfortunately there was no grid reference given. During the BTO bird surveys recorders were asked to count the numbers of hares seen during their visits. The 'best' 1-km squares for hares appear to be ST 6760 (9), ST 3255 (7), ST 7986 (5), ST 3056 (4) and ST 7659 (3).

(Records from RLB, MBa, HC, PJC, P & LD, PF, PGF, CG, JG, LG, S & JG, J & CH, MaH, BM, CM, MJM, TMcL, DN, D & LP, SY, MT, SW, DT.)

**Rabbit** ***Oryctolagus cuniculus*** (83)
Eighty five records were received in 1998 from the following 1-km squares: **3**255, 3456, 3758, **3**5**6**6, **4**250, 4759, **4**0**6**9, 4762, 4765, 4962, **4**570, 4675, **5**055, 5056, 5658, 5759, **5**1**6**0, 5467, 5564, 5868, 5962, **5**273, 5475, **5**4**8**5, 5680, 5787, **6**250, 6251, 6356, 6553, 6556, 6757, 6850, **6**4**6**7, 6760, 6968, **6**479, 6972, **6**3**8**6, 6780, **6**094, 6295, **7**356, 7659, **7**0**6**6, 7267, 7369, 7461, 7569, 7664, 7668, 7768, 7868, **7**071, 7072(2), 7171, 7172, 7270, 7271, 7272, 7371, 7372, 7373, 7374, 7375, 7472, 7478(2), 7572, 7577, 7578, 7672, 7673, 7674, 7675, 7677, 7776, 7777, 7778, 7879, **7**8**8**7, 7486, 7581, 7685. (Records from AB, JB, RLB, HC, JC, PJC, P & LD, RE, WE, DF, PF, AG, JG, LG, S & JG, CH, G & AH, MaH, MiH, NH, PaH, HJ, MK, PL, BM, CM, MJM, JMa, JMi, TMcL, DN, AP, D & LP, RP, CR, DS, DT, JT, MW, SW, SY).

Only one of these records suggested that the rabbit had myxomatosis (ST 5475).
In a Hansard Written Answer to Parliament on November 17, Agriculture Minister Elliot Morley reported that damage caused by rabbits to agriculture is estimated at £40 million per annum.

**RODENTIA (rats, mice, voles and squirrels)**

**Brown Rat** ***Rattus norvegicus*** (25)
Twenty five records of brown rats in 1998 (compared with only 6 in 1997) were as follows: **4**85**9**, 4959, **4**0**6**9, **4**674, 4772, 4774, **5**655, 5658, **5**66**1**, **5**276, 5476, 5571, 5579, 5679, **6**250, 6653, **6**179, 6370, 6379, 6470, **6**0**8**1, 6583, **6**29**5**, **7**777, **7**7**8**8. (Records from RLB, JB, HMB, PJC, RE, LG.)

**Black Rat** ***Rattus rattus***
No records of any black rats in Avon but black rats can still be found on the island of Lundy together with brown rats ('Wildlife Reports' in *British Wildlife* **9**(2) December 1997).

**Grey Squirrel** ***Sciurus carolinensis*** (75)
There were 123 records of grey squirrels in 1998. They were in the following 1-km squares: **3**758, **4**56**0**, **4**672, 4677, 4772, 4777, **5**1**6**0, 5169, 5467, 5564, 5760, 5761, 5769, 5868, 5869, **5**273, 5370, 5571, 5579, 5671, 5673(27), 5674, 5675(3), 5678(3), 5771, 5772(2), 5775(2), 5776(6), 5777(2), 5778(3), 5873(2), 5874, 5876, 5877, 5971, 5974, **5**68**0**, 5781(3), **6**250, 6251, 6356, **6**169, 6568, **6**078, **6**174, 6175, 6271, 6273, 6276, 6374, 6470, 6573(2), 6670, 6677, **6**58**0**, 6583(2), 6780, **6**29**5**, 76**5**2, 70**6**5, 7168, 7369, 7461, 7664, 7668, 7768, 7868, 7072, 7472, 7475, **7**28**4**, 7486, 7581, 7789, 7986. Numbers in brackets show where there are more than one record for the 1-km square. Three of the above records were squirrels feeding at bird feeders or bird tables. (Records from JA, NA, RLB, MB, JFB, HC, JC, PJC, AD, P & LD, RE, DF, PGF, LG, S & JG, MH, PH, HJ, MK, PL, BM, JMM, MJM, AP, DP, RP, DS, DuS, DT, DPCT, AW.)

**Water Vole** ***Arvicola terrestris***
Water voles continue to be recorded regularly in the Avonmouth area (David Clarke pers. Comm.).

In 1997 it was reported that The Vincent Wildlife Trust feared that water voles would be on the verge of extinction by the year 2000. In December 1998 they completed their second survey of water voles after a gap of seven years. It seems that the predicted level of 94% of water vole sites lost was very likely to come true. Population loss is probably greater than 89%. It is thought that mink can exploit water vole burrows and once they are resident on a stretch of river, regular foraging results in loss of any water voles that are present. Consequently small discrete populations are particularly susceptible to extinction (Wildlife Reports, *British Wildlife* **10**(3) February 1999).

**Bank Vole** ***Clethrionomys glareolus*** (4)
Records of bank voles caught during the Mammal Society National Yellow-necked Mouse Survey from **46**62, **46**72, 79**66**, 7571 (AM).

Ecologists in Sweden have found that bank voles can have beneficial effects on the plants they eat by slowing the spread of fungus. Research showed that after two summers the level of fungal disease in chickweed was lower in experimental plots that contained bank voles than in plots that did not. Further investigation revealed that bank voles preferred to eat diseased shoots although it is not yet clear why (Vole Power *British Wildlife* **16** (2) February 1998).

**Short-tailed Field Vole** ***Microtus agrestis*** (3)
There were three records of Short-tailed field voles in 1998. One was seen on a warm day in January in a playing field in Avonmouth 5377 (DC). Another record was of an adult with 3 young in a nest at allotments in Brislington in May 6170 (PGF). Two field vole skulls were found at Royal Portbury Dock 4877 (RE). Studies have shown that the national population of field voles has declined. It is thought that this isn't necessarily a result of predation but due to a change in farming practices and the general tidying up of the countryside (Wildlife Reports, *British Wildlife* **10**(3) February 1999).

Dyczkowski and Yalden (1998) estimate that the annual production of field voles in Britain is between 677,000 and 982,000 per year. It is estimated that around 980,000 field voles are predated each year by all the major predators, both mammalian (including feral cats) and avian. Two specialist vole predators (weasel and kestrel) and two generalist predators (fox and feral cat) are estimated to consume 85% of the total between them with the other ten species, including tawny and barn owls, sharing the rest between them. However important voles might be for owls, owl predation is unimportant to voles.

**Harvest Mouse** ***Micromys minutus*** (2)
There was one record of a harvest mouse skull found in an owl pellet at Oldbury Power Station 6095 and another skull found in an owl pellet at Royal Portbury Dock 4877 (RE). It was also reported by Bristol Water that Harvest mice nested in reed beds around Chew Valley Lake in 1998 using the "tennis ball artificial nests" which had been erected for them. This will hopefully be followed up in 1999. (Chris Klee pers. Comm.)

**Dormouse** ***Muscardinus avellanarius***

The monthly dormouse surveys organised by David Clarke continued at Kings Wood, Cleeve (see previous mammal reports for details). Paul Bright of Royal Holloway College, University of London published the findings of The Victorian Nut Hunt which aimed to determine whether dormice still survived at sites they were known to inhabit in the nineteenth century. The results showed that evidence of dormice was found at only 13% of the sites (Wildlife Reports, *British Wildlife* **9**(6) August 1998). The Daily Telegraph launched an appeal to find homes for 100 Dormice whose habitat was destroyed by the Channel Tunnel Link. A suitable location was found in the Mendips, and some were later moved to the Midlands (Wildlife Reports, *British Wildlife* **10**(1) October 1998).

**Woodmouse** ***Apodemus sylvaticus*** (9)
Records from the following 1-km squares: **4**66**2**, **4**672, 4976, **5**573, 5673, 5870, **6**677, 79**6**3, 7571. Two records were victims of cats, the remainder were caught in Longworth live capture traps. (Records from MB, DC, RE, AM, DPCT.)

A study by the Mammal Society "What the Cat Brought In" showed that cats killed a wide variety of mammal, bird and reptile species. Cats killed more mice than voles and were not very successful at killing rats. Other species included weasels, stoats, rabbits, grey squirrels and bats. Interestingly it was found that the "mean kill rate" was greater for cats that wore bells than those without. Perhaps the bell makes them more stealthy? (*Mammalaction News*, **82**, Summer 1998)

**House Mouse** ***Mus domesticus*** (1)
There was just one record of a house mouse which was a victim of a cat in May at ST 5870 (MJM). However it was reported that mice (house mice?) have caused chaos at the junction by Cribbs Causeway, leading to The Mall Shopping Centre in Bristol by chewing through traffic light cables (Tale of the Out-of-Town Mouse That Stops Traffic *Bristol Evening Post*, 6 March 1998).

**Yellow-Necked Mouse *Apodemus flavicollis*** (4)
A National Yellow-Necked Mouse Survey was co-ordinated by Aidan Marsh of Bristol University. It aimed to answer many questions about the yellow-necked mouse including the first national picture of species distribution since the 1970s. Groups of forty Longworth traps were used at various locations for two consecutive nights. It was widely believed that yellow-necked mice were associated with ancient broadleaved woodland. However this research showed that specific habitat features and climate might explain their distribution more accurately. The surveys in the south west of England have shown that "yellow-necked mice prefer woodlands with dense canopies and sparse ground flora. Though the age of the woodland may not be of direct importance, mature woodlands are more likely to provide this habitat. Yellow-necked mice may also need a higher diversity of tree seeds than the wood mouse, something that mature woodlands often provide. The yellow-necked mouse is far more widespread across continental Europe, and in Britain, its distribution is correlated with warmer, drier parts of the country. Climate, rather than habitat may explain why wood mice still rule the woods." (Yellow-neck of the woods? *BBC Wildlife* **16** (7) July 1998.)

The results of the trapping in 'Avon' are as follows:-

| | ST 753712 Henley Tyning Wood Wildlife Trust | ST 793663 Warleigh Wood Wildlife Trust | ST 466725 Tickenham Hill Wildlife Trust | ST 464662 Brockley Wood Wildlife Trust | ST 557735 Leigh Woods DPCT/MJM |
|---|---|---|---|---|---|
| *Apodemus sylvaticus* | 16 | 12 | 4 | 15 | 3 |
| *Apodemus flavicollis* | 1 | 5 | 3 | 3 | 0 |
| *Clethrionomys glareolus* | 1 | 5 | 3 | 5 | 0 |
| *Sorex araneus* | 0 | 0 | 1 | 0 | 0 |

**CETACEA (whales, dolphins and porpoises) and PINNIPEDIA (seals)**

**Grey Seal *Halichoerus grypus*** (1)
There was one record of a grey seal seen off the landing beach at Steep Holm 2360 on 8 August (RLB).

In a Hansard Written Answer to Parliament on November 17, Minister of Agriculture, Fisheries and Food Elliot Morley reported that the estimated UK population of grey seals in 1997 was 115,000 animals. These seals were estimated to have consumed 232,000 tonnes of fish, predominantly sand-eels, cod and

whiting. As a significant proportion of the fish consumed were likely to have been juveniles and therefore, because of high rates of natural mortality, not likely to have survived to maturity, the effects on commercial fishermen and anglers was considered to be less than at first thought.

The total number of grey seals in Great Britain in 1990 was estimated to be 99,500 with a breeding population of 3,000 in south-west Britain (Anglesey/Isle of Man to the Cornish coast) (Corbet and Harris 1991).

**Striped Dolphin** ***Stenella coeruleoalba*** (1)
A female striped dolphin was washed up into The Marine Lake at Clevedon 3971 on 5 December (RB). It was freshly dead and seemed to be in a fair condition. It was sent to London Zoo for autopsy, but the findings are not known as yet.

The Striped Dolphin is distributed world wide mainly in tropical and warm temperate waters. In British and Irish waters it is rare, being recorded almost exclusively from the south-west. Between 1913 and 1962 there were only four records of strandings on British and Irish coasts. Between 1962 and 1988 a further 16 were recorded. Previous records have been between July and September and December and February (Corbet and Harris 1991).

**CARNIVORA (carnivores)**

**American Mink** ***Mustela vison*** (2)
A record of a dead mink in Southmead in Bristol 5878 (HMB) and one seen in Snuff Mills 6175 (RE). Several thousand mink were released from mink farms across the country during late summer/early autumn by The Animal Liberation Front. However, most only ventured a few yards, preferring to stay near their food source (*BBC Wildlife* **16**(10) October 1998).

**Stoat** ***Mustela ermina*** (3)
One record of a buzzard feeding on a stoat in early August 7876 (PJC) and one seen dragging a dead rabbit in Leigh Woods 5475 in August (AB). A record of a stoat in 6250 (LG).

**Weasel** ***Mustela nivalis*** (7)
There were seven sightings in 1998, one at 5674 (RLB), one running across the road at 7878 (PJC) and one seen at 7786 (PJC). Weasels were also recorded in the following 1-km squares: 5056, 6250, 6760 and 7486 (records from LG, JMi and DT).

**European Polecat** ***Mustela putorius***
A study was undertaken by The Vincent Wildlife Trust to explore the risk from secondary rodenticide poisoning of polecats which use farmyard in winter (Birks 1997). It was found that ten out of eleven polecats which were radio-tracked used

farmyards during winter and that 65% of their diet consisted of rodents. The paper also illustrated that current government monitoring under the Wildlife Incident Investigation Scheme does not reveal the true level of contamination of polecats because they tend to die out of sight and are therefore not reported. It is suggested that residue analysis of liver tissue from road casualty polecats recovered in winter and spring should be undertaken to monitor background levels of rodenticides.

**Otter *Lutra lutra***

It was reported in the Mammal Report last year that an otter was found in Gloucestershire for the first time in 25 years. There have been no records of otters in Avon, but perhaps 1999 will be the first time they are recorded in Avon!

**Badger *Meles Meles*** (38)

Dead badgers (all adults unless specified), probably all as a result of road traffic accidents, were recorded from the following one km squares (all ST): **4**271, 4574, **5**266, 5963, **5**776, **6**652, **6**262, 6469, 6668, 6866, **6**377, 76**5**9, 7756, 7759, 7**8**64 (2 records, one badger on each side of the road on June 30 and one on October 2), 7372, 7476, 7477, 7576, 7778.

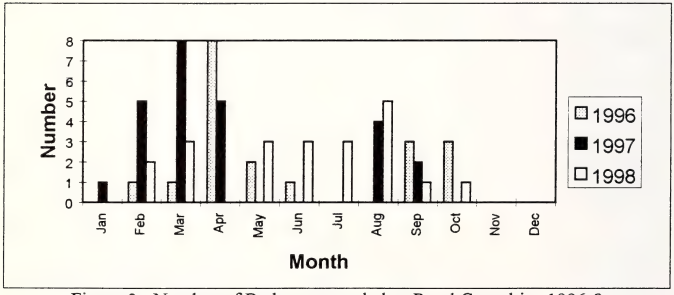


Figure 3. Number of Badgers recorded as Road Casualties 1996-8

As in 1996, Figure 3 shows a pattern of two peaks in the spring and autumn of 1998 when badgers are more likely to get run over. The spring peak reflects the peak in territoriality and also the mating season and the autumn peak is likely to reflect when the cubs leave the sett where they were born and disperse.

Other badger records from 7478 (one crossing the road, seen on two consecutive days at this location), 76**8**7, 7188 and **8**182 – badger setts. (Records from RLB, MB, PJC, PGF, JMM, MJM and DPCT.)

The BTO Breeding Bird survey produced records of badgers from **3758**, 3854, **3566**, **4675**, **5160**, 5467, 5564, **5273**, **6250**, 6251, 6356, 6556, 7065 and 7486 (N & BC, P & LD, DF, LG, CH, TMcL, AP, RP, DuS, DT).

**Badgers and Bovine Tuberculosis**

Farmers have been increasingly frustrated with the situation regarding badgers and TB and conservationists fear that this may lead to even more badger persecution. (Frustrated Farmers and Proactive Badgers, *BBC Wildlife* **16**(2) February 1998). The Krebs report (1997) on badgers and TB was critical of MAFF's past research programmes. He recommended that a five-year trial be set up. Thirty 10-km squares in England and Wales have been identified as "hotspots" where TB breakdowns in herds have been greatest in recent years. In these areas there will be either (a) reactive culling of badgers where the whole social group of badgers is removed following a herd breakdown or (b) proactive culling where the social group is removed before a herd breakdown occurs or (c) no culling takes place. The trial has now begun which will in fact take six or seven years with the first two areas being in North Cornwall/Devon and Gloucestershire/Hereford and Worcester border. The Mammal Society and the National Federation of Badger Groups believe that MAFF should divert resources into an integrated approach to the problem by continuing with vaccine development and also studying the route of disease transmission. (It's official: 12,000 Badgers to Die *BBC Wildlife* **16**(10) October 1998.) There is also criticism that MAFF may be in breach of the Bern Convention (Europe's longest standing wildlife treaty) because the badger is declining across Europe. MAFF argues that governments can make exceptions to the prohibitions in certain circumstances.

Further information on Badgers and TB can be found on the MAFF web site at http://www.**maff.gov.uk/animalh/tb/default.htm**

**Fox *Vulpes vulpes*** (51)

Records of foxes were received from the following 1-km squares: **3056**, 3758, 3854, 3856, **3566**, **4069**, **4675**, **5559**, **5564**, **5273**, 5571, 5579, 5778(2), 5876, 5878, **5485**, 5781(2), 5787, **6250**, 6251, 6356, 6556, **6365**, 6568, 6661, 6968, **6378**, **6286**, 6489, 6488, 6583, **6295**, **7065**, 7267, 7664, 7668, 7864, 7866, **7270**, 7271, 7475, 7476, 7572, 7576, 7777, 7778, **7486**, 7581, 7687, 7688, 7887. (Records from JB, RLB, N & BC, PJC, DC, JC, P & LD, RE, DF, PGF, LG, S & JG, CH, MiH, TMcL, DuS, MJM, GM, JMa, DN, HN, AP, DP, D & LP, RP, DT, DPCT, AW, MW)

With approximately 95% of Bristol's foxes dying from sarcoptic mange between 1995 and 1996, records of foxes in Bristol were once again being received in 1998 with 28 records having been received (although this was a decrease on the 1997 total of 38 records). The only records of foxes seen within the City of Bristol in 1998 are as follows:-

ST 5876 (Jan) – Fox seen in Henleaze wearing an orange collar (HN)
ST 5781 (May) – One heard in Westbury-on-Trym (JFB)
ST 5571 (June) – One large cub run over at Bower Ashton (DPCT)
ST 6378 (Aug) – Dead fox at Junction 1 of the M32 (DP and DPCT)
ST 5778 (Sept) – Droppings on grass in Westbury-on-Trym (MJM)
ST 5781 (Sept) – One seen in Westbury-on-Trym (JFB)
ST 5778 (Oct) – Fox seen lying in the sun at Westbury-on-Trym (MJM)
ST 5878 (Oct) – Fox feeding in a garden in Southmead (GM)

**ARTIODACTYLA (deer)**

**Red Deer** ***Cervus elaphus*** (2)
Two unconfirmed sightings of red deer, two seen near Kelston **71**68 (AD) and two seen nearby at 7267 (P & LD). Perhaps these are the same two deer?

**Roe Deer** ***Capreolus capreolus*** (43)
There were 43 records of Roe Deer in the following 1-km squares: **32**58, 3854, **42**41, **42**50, **48**61, 5056, 5559, **54**67, 5564, **51**74, 5273, **62**50, 6251, 6356, **61**63, 6366, 6564, 6663, 6866, **65**83, 76**5**9, 70**6**5, 7369, 7461, 7664, 7668, 7768, 7868, 7375, 7476, 7478, 7573, 7575, 7576, 7577(3), 7579, 7673, 7675, 7676, 7**48**4, 7486, 7685, 7687 (Records from RLB, JC, N & BC, HC, JCo, PJC, P & LD, RE, DF, PF, PGF, AG, LG, J & CH, HJ, MK, PL, CM, BM, JMi, MJM, AP, RP, DT, DPCT, AW).

Wild deer, presumably roe deer, were reported to be trampling and eating vegetables in allotments in the Hamfield area of Cheddar. Parish councillors were asking the National Trust and Mendip Hills wardens to implement a deer management scheme. ('Deer wreck allotments' Bristol Evening Post 31 December).

**Fallow Deer** ***Dama dama*** (1)
Apart from fallow deer in deer parks there was one sighting at 6295 near Oldbury Power Station (S & JG). Research by Bartos and Losos (*Canadian Journal of Zoology,* **75** 1934-9) has shown that "when male fallow deer compete successfully with other males during the period of antler growth, their antlers grow larger. They also noticed that the particular part of the antler developing when a successful male was engaged in battle was the area that became enlarged. A drop in rank during antler growth had a corresponding effect: the part of the antlers developing at the time became smaller. It should, therefore, be possible to work out the rank history of a male fallow deer over a particular season from the size and shape of his antlers." (Rising from the Ranks, *BBC Wildlife* **16** (5) May 1998.)

**Chinese Muntjac Deer** ***Muntiacus reevesi*** (1)
There was one sighting of a Muntjac at 7887 near Hawkesbury (MW).

**Deer Damage**
A paper by Putnam and Moore (1998) reviewed the available information on the impact of deer in lowland Britain. Populations of a number of species of deer are increasing both in range and in geographical distribution in lowland Britain. Roe deer and Muntjac are increasing both in distribution and abundance; Fallow are increasing in abundance within their current range; Red Deer are generally of restricted distribution but of local significance. The two remaining species Chinese Water Deer *Hydropotes inermis* and Sika Deer *Cervus nippon* are of rather restricted distribution and abundance in lowland Britain. The nearest Chinese Water Deer are in Bedfordshire and the nearest Sika deer are in Dorset.

As a result there is increasing concern about damage to horticulture, agriculture and forestry as well as damage to sensitive vegetation in conservation areas. The majority of agricultural damage reported in England and Wales was due to Fallow, Red and Roe Deer. Muntjac were only implicated in horticultural damage where they were particularly numerous. In woodland again Fallow, Red and Roe Deer were the main culprits with most damage being reported in the north of England and the least in Wales.

Despite the apparent severity of the damage the actual economic significance of the damage appears to be in many cases small or negligible. Field crops frequently recover completely from grazing and damage to woodland, through browsing, may not be as serious as they first appear.

Deer damage to habitats of conservation importance in England and Wales are largely restricted to some woodland habitats with the grazing impact on heathlands, grassland and wetlands generally welcomed as helping to arrest invasion by scrub.

**'BEASTS'**
Sightings of 'panthers', 'big cats', 'beasts' etc. continue to hit the headlines. A panther sized black cat was reported to have been seen on several occasions in villages close to Stroud ('Panther sightings continue' Stroud News and Journal). Other reports of large cats have been received from the Cheddar and Blagdon area (Alan Britton pers. Comm.).

**PUBLICATIONS**
1998 saw the publication by the Department of the Environment, Transport and the Regions (DETR) and the Joint Nature Conservation Committee (JNCC) of an important document 'Proposals for future monitoring of British mammals'. The report outlines proposals for the setting up of a national Mammal Monitoring Network with repeated sampling of a series of sites throughout the British Isles.

As with surveys by organisations such as the British Trust for Ornithology, the success of such a network will be very dependent on a large number of volunteer recorders supported by a core of full time professionals. This is an exciting development and it is hoped that the Bristol Naturalists' Society members will be able to contribute to this vital work.

## LEGISLATION

The government accepted that the water vole should be included under Schedule 5 of the Wildlife and Countryside Act 1981. This means that it is an offence to damage or destroy, or obstruct access to, any of the habitats that the voles use for shelter, or to disturb the animals while they are occupying such habitats.

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## REFERENCES

Birks, J.D.S. (1998) Secondary Rodenticide Poisoning Risk Arising from Winter Farmyard Use by the European Polecat *Mustela putorius*. *Biological Conservation* **85** 233-240.

Corbet, G.B and Harris, S. (editors) (1991) The Handbook of British Mammals (3rd edition). Blackwell Scientific Publications.

Dyczkowski, J and Yalden, D.W. (1998) An estimate of the impact of predators on the British Field Vole *Microtus agrestis* population. *Mammal Review* **28** 165-184.

Oakeley, S.F. and Jones, G. (1998) Habitat around maternity roosts of the 55 kHz phonic type of pipistrelle bats (*Pipistrellus pipistrellus*). *Journal of Zoology (London)* **245** 222-228.

Putnam, R.J. and Moore, N.P. (1998) Impact of deer in Lowland Britain on agriculture, forestry and conservation habitats. *Mammal Review* **28** 141-164

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# BRISTOL & DISTRICT INVERTEBRATE REPORT, 1998

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## INTRODUCTION

The overriding impression of 1998 was of a cool and wet year with little in the way of interesting entomology to report. February had a freakish period of very warm weather and later on, elsewhere in the country, dragonflies blown over from North America appeared but sadly none were sighted in our district. Unseasonably early or late records continued to be received for some orders, as reported below in the species lists. It seems ironic that with all the interest in global warming and seemingly increasing average temperatures, that the weather can seem so poor for insects!

The year started well enough with an early Brimstone on the wing on 10 January but overall the butterfly year was very poor. The Holly Blue was about the only butterfly species to have a recognisably good year, continuing its current run of years of abundance, presumably a crash in numbers will come soon. The success or otherwise of the attempted reintroduction of the Marsh Fritillary was not helped by such a bad year weather wise and it appears unlikely that this experiment will succeed. The Pearl-bordered Fritillary still gives great cause for concern, clinging on at the one site on the borders of Somerset and what was Avon.

On the moth front, one species that did seem to do well was the Privet Hawk-moth and certainly Bristol Museum received more enquiries generated by people finding this large and impressive species than in other years. Migrants were patchy with respectable numbers of the Gem and Vestal but only one Convolvulus Hawk-moth and very few Humming-bird Hawk-moths. The Red-belted Clearwing appeared at an urban locality in Bristol where it had not been seen at before, probably again a population that has clung on since the city was much smaller, surviving in gardens and allotments and even street trees.

The micro-moth *Tachystola acroxantha* has a story that parallels that of *Epiphyas postvittana* in some ways. Both are native species to Australia that have become naturalised in the South-west peninsula for some time but only relatively recently have they apparently been able to expand their populations across into much of southern England. *E. postvittana* has been most successful and is now probably the commonest moth in gardens in Bristol, thanks to a population expansion over the last ten or more years. Its success is no doubt due partly to its ability to utilise a variety of larval food-plants. *T. acroxantha* has been with us for some time, Ken Poole has an illustration of it he made in Weston-super-Mare in the late 1940s and Martin Evans also used to record it at Worle frequently in the 1980s. In the last

two years reports of its expansion across into Hampshire, for example, suggest it is on the move. Again it is likely to be associated with conurbations, particularly as its larval foodplant is Eucalyptus. The spread of both moths may be due to increased average temperatures in recent years.
It is encouraging to report the discovery of another new site for the Red Data Book micro-moth *Salebriopis albicilla*. This confirms the importance of the Bristol District for this Small-leaved Lime feeding specialist.

There has been a dearth of records of the smaller orders which again reflects the year in terms of weather as well as the paucity of recorders. Robert Cropper continues to chart the onward progression of the Long-winged Cone-head, which will hopefully appear even closer to home soon. The Bristol Region Dragonfly Recording Scheme has started on its drive to update the atlas published by Simon Randolph in 1992 and has also taken on attempting to increase *orthoptera* recording as a sideline.

The most significant event of the year as far as the diptera go was undoubtedly the publication of Ted and Dave Levy's "Somerset Hoverflies" which highlighted what an interesting District this is. Rare species, such as *Orthonevra brevicornis*, *Myolepta luteola* and *Chalcosyrphus eunotus*, to name but a few, can be found by the diligent entomologist. The Bristol & District Hoverfly Group which had been in aestivation for a short time, met at the end of the year and it is hoped more interest will be shown in the coming season. The immigration of another expert, Dave Gibbs, into Bristol will hopefully aid this process.

1998 saw the transfer of responsibility for management and wardening of Leigh Woods National Nature Reserve from English Nature (E.N.) to the National Trust, owners of the site. This meant the departure of E.N. warden Tony Robinson to pastures new in Somerset, someone who has done much to foster interest in the site and been largely responsible for the re-colonisation by the Silver-washed Fritillary thanks to the management introduced. Tony has also relinquished responsibility for the Gordano National Nature Reserve that is now administered from Taunton by E.N. This probably means the demise of the Gordano Valley Invertebrate Group, which met on an occasional basis. By compensation the Avon Wildlife Trust has been acquiring more reserves which may turn out to be entomological gems, at present they are largely completely unknown in this respect.

Observers mentioned in the species list:
Mike Bailey (MB), Ray Barnett (RB), Jerry Board (JB), Alan Bone (AB), Richard Bonney (RBo), Rachel Corlett (RCo), Robert Cropper (RC), Andrew Daw (AD), Bill Dixon (WD), Martin Evans (ME), Derek Foxwell (DF), Dave Gibbs (DG), Bob Heckford (RJH), Rupert Higgins (RH), Sylvia Kelly (SK), Ted & Dave Levy (E&DL), John Martin (JM), Jean Matthews (JeM), Tony Moulin (AM), Edward

G.M.Niblett (EGMN), Ken Poole (KP), Andy Pym (AP), Bob Rowe (RWR), Frances Stenner (FS), Des Sweet (DS), John Weeks (AHW), Daryl Watts (DW), Chris Wiltshire (CW), Mrs C.Woodyatt (CWo).

My thanks also to those who, in addition, submitted records which do not appear in this report but which help significantly to build up a picture of our invertebrate fauna, and to the Bristol Regional Environmental Records Centre (BRERC).
Scientific nomenclature follows the names given in Duff (1993), Emmet (1991), Potts (1964) and Smith (1976).

## WEATHER SYNOPSIS (by John Weeks).

1998's mean temperature of 11.3° C was the same as 1997's making it equal fourth for warmth in the last ten years. (1990 11.7°, 1989 11.5°, 1995 11.4°.)
Seven of the mean monthly maximum temperatures showed negative anomolies (including all three summer months) but these rather cooler maxima were offset by warmer minima and minimum averages were above the normal in nine months. Sunshine levels varied widely; percentages in the six months of spring and summer, March to August, exceeded normal only in May and August, and were woefully low in April, June and July.

Total rainfall for the calendar year was just over 1043mm, 125% of average, the highest since records began at this station (first full year 1980), the previous record being 1031mm in 1994. It was the first year when no snow was seen falling; the previous lowest was one day in 1992. It follows that on no day was there snow lying, the first year since 1995.
The table gives an overall view of the months and seasons.

TABLE 1. Monthly and seasonal trends in climate during 1998

| | Monthly Differences | | | Seasonal Differences | |
|---|---|---|---|---|---|
| | Max T.C. | %Rain | % Sun | Max TC | % Rain |
| Dec | -2.4 | 133 | 125 | | |
| Jan | +0.6 | 115 | 140 | | |
| Feb | +3.0 | 35 | 110 | +1.7 | 97 |
| Mar | +0.3 | 190 | 80 | | |
| Apr | -1.0 | 215 | 70 | | |
| May | +1.6 | 64 | 110 | +0.4 | 160 |
| Jun | -1.2 | 290 | 60 | | |
| Jul | -2.5 | 84 | 70 | | |
| Aug | -0.6 | 40 | 130 | -1.5 | 120 |
| Sep | +0.8 | 120 | 90 | | |
| Oct | -0.3 | 204 | 90 | | |
| Nov | -0.5 | 95 | 110 | 0 | 140 |

The very cold December of 1997 gave way to a warm start to the new year. The first three weeks of January were mild and very wet, but the last ten days started a cold snap which ran into early February. The weather then became warm again, but dry. The month ended as the driest February since 1993. With March came another reversal as this month was the wettest since 1980. The 6th was a very wet day, with 25.5mm.

April was another wet month, the wettest April since records began at this station. It was also cool, the mean maximum being the lowest since 1989.

May was delightfully seasonable, warm, dry and comparatively sunny, with only one sunless day, but it was the most thundery month of the year. A vicious storm occurred on the evening of 13th, with particularly heavy rain in the Bruton area. The press reported 31 lightning strikes on the Mendip TV transmitter.

June was another month that turned out to be the wettest on record at this station. There were only three completely dry days. However it offered some slight compensation by providing the first really warm day of the year with a maximum of 27.9°C on 20th. On the other hand, the warmest day in July produced a poor 22.9°C. August came nearest to a normal summer month, with low rainfall and good sunshine (only two sunless days). The warmest day of the year was the 9th with a maximum of 29.7°C.

Autumn was heralded by a warm but wet September, with four sunless days. October was extremely wet and included the wettest day of the year on the 31st with 32.4mm. November and December were undistinguished.

Winds blew predominantly from the south-west to north-west quadrant. The number of days on which this was the case at morning observation (09.00) in the wettest months were:- March – 20, April – 15, June – 20, September – 14 and October – 20. Over the year winds were south-westerly on 94 days, westerly on 73 days and north-westerly on 54 days.

## SPECIES OF NOTE IN 1998

ORTHOPTERA (grasshoppers and crickets)

**Long-winged Cone-head** *Conocephalus discolor* (Thunb.) Frome ST769465 30 August; Standerwick ST816508 30 August; Norton-sub-Hamden ST458169 no date (all RC).

DERMAPTERA (earwigs)

**Lesser Earwig** *Labia minor* (L.) Chilcompton ST6351 4 October; Timsbury ST6559 11 October; Brent Knoll ST3351 12 December (all in dung heaps) (RC).

**Lesne's Earwig** *Forficula lesnei* Finot Weston-in-Gordano ST451749 13 September (4 males, 5 females in scrub near quarry) (RC).

LEPIDOPTERA (butterflies)

**Essex Skipper** *Thymelicus lineola* (Ochs.) St. Catherine's Valley ST766721 25 July (AD).

**Brimstone** *Gonepteryx rhamni* (L.) Clevedon Golf Course ST4173 10 January (EGMN).

**Small White** *Pieris rapae* (L.) Yatton ST430653 15 January, 8 February (very early dates) (AM).

**White Admiral** *Ladoga camilla* (L.) Whitchurch ST6067 (no date) (garden) (DF); Yatton ST437655 1st week of July (garden) (AHW); Bathford ST547998 5 August (garden) (CWo).

**Small Pearl-bordered Fritillary** *Boloria selene* ([D.&S.]) Crook Peak ST396560 29 May (JB).

**Marsh Fritillary** *Eurodryas aurinia* (Rott.) Priddy Mineries ST547515 29 May (AD).

LEPIDOPTERA (macro-moths)

**Lunar Hornet Moth** *Sesia bembeciformis* (Hb.) Portbury Wharf ST496776 (no date) (RH).

**Currant Clearwing** *Synanthedon tipuliformis* (Cl.) Weston-super-Mare ST334621 (no date, larva) (KP).

**Red-belted Clearwing** *Synanthedon myopaeformis* (Borkh.) Totterdown ST57 23 June (coll: JeM, det: RB).

**Small Eggar** *Eriogaster lanestris* (L.) Pilning ST 58 28 March (JM) (adult to light); Olveston Common ST58 June (larval web) (ME, JB); Littleton Wharf ST59 June (larval web) (ME, JB); Sand Point ST3265 3 June (CW), Weston-super-Mare ST323659 6 July (larval web) (FS).

**The Gem** *Orthonama obstipata* (Fabr.) Portishead ST4574 14, 16 May, 10, 15 July, 27 August and 27 September (WD); Timsbury ST659587 28 June (MB); Newton Park ST693639 7 July (DW); Bishopston ST589775 (no date) (RH); Sandbay ST36 23 July (DS).

**The Vestal** *Rhodometra sacraria* (L.) Yate ST78 23 July (JM), Newton Park ST693639 3 September (DW), Timsbury ST659587 4 September (MB).

**Scorched Carpet** *Ligdia adustata* ([D.&S.]) Filton ST6179 28 March (very early date) (AP).

**Early Thorn** *Selenia dentaria* (Fabr.) Keynsham ST654679 17 March (early date) (AB).

**Barred Umber** *Plagodis pulveraria* (L.) Newton Park ST693639 27 July (DW).

**Convolvulus Hawk-moth** *Agrius convolvuli* (L.) Worle ST36 4 September (RBo).

**Elephant Hawk-moth** *Deilephila elpenor* (L.) Long Ashton Research Station ST5369 27 February (very early date) (CW).

**Poplar Kitten** *Furcula bifida* (Brahm) Keynsham ST654679 14 May (AB).

**Silver Y** *Autographa gamma* (L.) Chew Valley Lake ST56 14 February (RH).

LEPIDOPTERA (micro-moths)

*Nemophora cupriacella* (Hb.) Thornbury Leisure Centre ST6389 19 July (RB).

*Luffia ferchaultella* (Steph.) Clifton Down ST5674 11 May (larvae) (RB).

*Psychoides filicivora* (Meyr.) Clifton ST5773 18 December (imago) (ME).

*Phyllonorycter leucographella* (Zell.) Bristol ST597721 14 December, ST591727 29 December (larval mines) (1st record for the District) (RJH).

**Diamond-backed Moth** *Plutella xylostella* (L.) Filton ST6179 28 March (early date) (AP); Bishopston ST589775 28 March (early date) (RH).

*Tachystola acroxantha* (Meyr.) Weston-super-Mare ST334621 (no date) (KP) (recorded here first in 1947/8).

*Phtheochroa rugosana* (Hb.) Portishead ST4574 (no date) (WD).

*Epiphyas postvittana* (Walk.) Weston-super-Mare ST3361 February, (early date) (RWR).

*Acleris literana* (L.) Bishopton ST589775 (no date) (RH).

*Commophila aeneana* (Hb.) Bristol ST5771 (no date) (ME).
*Catoptria falsella* ([D.&S.]) Timsbury ST659587 17 August (MB).

*Sitochroa palealis* ([D.&S.]) Bedminster ST582708 28 July (RH).

**Small Magpie** *Eurrhypara hortulata* (L.) Keynsham ST654679 17 March (very early date) (AB).

*Mecyna flavalis* ([D.&S.]) Timsbury ST659587 27 July (MB).

*Salebriopsis albicilla* (H.-S.) Weston Big Wood ST4574 8 July (JM).

COLEOPTERA (beetles)

**Summer Chafer** *Amphimallon solstitialis* (L.) Weston-super-Mare ST332617 6 July (RWR).

**Rose Chafer** *Cetonia aurata* (L.) Westbury-on-Trym 12 February (very early date) (DW); Weston-super-Mare ST3261 18, 30, 31 March, 6 July (RWR), Goblin Combe ST475653 28 September (DG); Weston-super-Mare ST334621 (no date) (KP).

**Twenty-four Spot Ladybird** *Subcoccinnella vigintiquattuorpunctata* (L.) Thornbury Leisure Centre ST6389 19 July (RB).

*Pyrochroa coccinea* (L.) Monkswood ST7770 7 May (DG).

*Chrysolina violacea* (Mull.) Goblin Combe ST4765 13 May (DG).

*Platyrhinus resinosus* (Scop.) Leigh Woods ST5573 8 March (RB).

DIPTERA (flies)

*Oxycera pulchella* Meig. Loxley Wood, Shapwick ST408377 14 July (E&DL).

*Odontomyia ornata* (Meig.) Loxley Wood, Shapwick ST408377 4 July (E&DL); Tealham Moor ST4145 30 May (RC).

*Odontomyia tigrina* (Fabr.) Loxley Wood, Shapwick ST428408 22 May (E&DL); Tealham Moor ST4145 30 May (RC).

*Odontomyia viridula* (Fabr.) Loxley Wood, Shapwick ST408377 21 June (E&DL).

*Stratiomys potamida* (Meig.) Kingsdon Wood, Somerton ST518275 16 July (E&DL).

*Asilus crabroniformis* L. Huckham Hill ST4435 29 August (seen here in 1991) (RC).

*Bombylius discolor* Mik. Kingsdon Wood, Somerton ST518275 7 April (E&DL).

*Epistrophe diaphana* (Zett.) Loxley Wood, Shapwick ST408377 21 June (E&DL).

*Didea fasciata* Macq. Westhay Moor ST445445 23 September (E&DL).

*Cheilosia soror* (Zett.) Loxley Wood, Shapwick ST408377 14 July (E&DL).

*Myolepta luteola* (Gmelin) Loxley Wood, Shapwick ST408377 21 June (E&DL).

*Sphegina verecunda* Collin Great Breach Wood ST500320 25 September (E&DL).

*Volucella inflata* (Fabr.) Ashton Court ST557720 15 July (ME).

*Volucella zonaria* (Poda) Kingswood, Bristol ST658748 7 July (SK).

*Criorhina ranunculi* (Panz.) Kingsdon Wood, Somerton ST518275 7 April (E&DL).

*Physocephala rufipes* (Fabr.) Loxley Wood, Shapwick ST408377 14 July (E&DL).

*Sicus ferrugineus* (L.) Loxley Wood, Shapwick ST408377 4, 14 July (E&DL); Thornbury Leisure Centre ST6389 19 July (RB).

## REFERENCES

DUFF, A. (1993) *Beetles of Somerset.* Somerset Archaeological & Natural History Society, Taunton.

EMMET, A.M. & HEATH, J. (1991) *The moths and butterflies of Great Britain and Ireland. Vol.7 pt.2.* Colchester, Harley Books.

POTTS, W.H. (1964) *Kloet & Hincks, a checklist of British insects, part 1. Small Orders and Hemiptera* (2nd edition, revised). London, Royal Entomological Society.

SMITH, K.G.V. (1976) *Kloet & Hincks, a checklist of British insects, part 5. Diptera and Siphonaptera* (2nd edition, revised). London, Royal Entomological Society.

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# BRISTOL BOTANY IN 1998

by A.J. WILLIS

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The weather of 1998 was very changeable. Overall it was nearly 1°C warmer than average and very much wetter indeed. The year started with well above average temperatures in January and especially February (the mildest in Bristol since records began), although there was a substantial snowfall on 21-22 February. March was also a warm month. April had 125mm rainfall, more than twice the long-term average, leading to considerable flooding in some areas. However, May was dry, warm and sunny. In contrast, June had disappointing weather, with more than twice (136mm) the average rainfall (in Bristol the second wettest this century) and was distinctly sunless. July and August were of about normal temperatures but were both dry months. October was very wet, with 164mm rainfall, about twice the average. The year ended with fairly usual rainfall and temperatures, but few ground frosts; indeed there were only 28 ground frosts in the whole year. The total rainfall for the year at Long Ashton Research Station, to which meteorological records relate, was 1069 mm, 203 mm higher than the long-term (1961-1990) average. Except for the extremely wet 1993 (with 1082 mm rainfall), 1998 had the highest rainfall for a great many years. There were 211 days with more than 0.2 mm of rain.

Not surprisingly, in view of the weather conditions, 1998 was a quite advanced season. Indeed Stinking Hellebore (*Helleborus foetidus*) was in flower at Churchill Batch on New Year's Day. Snowdrops (*Galanthus nivalis*) were flowering at Uphill and at Edford Wood by the beginning of February. Green Hellebore (*Helleborus viridis*) at Nettlebridge was starting to bloom on 8 February and a week later was flowering at six other Mendip sites. A plant of Cow Parsley (*Anthriscus sylvestris*) was flowering in the Great Quarry under the Downs in Bristol on 14 February (PJMN). In March, Yellow-Star-of-Bethlehem (*Gagea lutea*) made an impressive show at its site in Stoke St Michael, although with fewer flowering stems than in 1997. Of over seventy rosettes of the Lizard Orchid (*Himantoglossum hircinum*) on the Berrow dunes counted in February, only eleven flowered in June. In September Brown Galingale (*Cyperus fuscus*) flowered more freely than in previous years in the Gordano valley (all records, except where indicated, RSC).

Several records made this year show the long persistence of plants in sites from which they have been feared to have been lost. Although the Early Spider-orchid (*Ophrys sphegodes*) had not been seen at its site near Dursley since 1985, it is now (1998) known to persist here. So also does the Green Hellebore (*Helleborus viridis*) at a site near Portbury known to J. W. White. On the other hand, as the

Cranberry (*Vaccinium oxycoccos*) has not been seen on Blackdown for nearly thirty years, it seems now lost from this site. Records of bryophytes made at Westhay Heath in 1969, which have only recently come to light, also show strong persistence of a number of rare or scarce species recorded earlier this century. The invasive aliens Indian Balsam (*Impatiens glandulifera*) and Japanese Knotweed (*Fallopia japonica*) appear to continue to spread; the Austrian Yellow-cress (*Rorippa austriaca*), first known in West Gloucestershire from Sharpness Docks in 1952 and from the Avonmouth area in 1974, has extended its distribution substantially in the latter.

Thanks to the efforts made to remove the toxic waste material in the Avon Gorge, resulting from the cleaning of the Clifton Suspension Bridge in 1995, the damage to the vegetation in the Gorge and especially to its many rare plants has been smaller than had been feared. The management of The National Trust part of Leigh Woods by English Nature (in consultation with the Trust) since 1970 ended in September 1998. Two National Trust Wardens, in residence at the pair of cottages, are now in charge. With the responsibility for managing the site passing back to The National Trust, English Nature will now play only an advisory role. Recent initiatives to revive pollard trees and coppiced woodland will continue and the Avon Gorge NNR will still be managed for its wildlife and amenity value.

The Proceedings of a Workshop held at Wakehurst Place on 28 April 1996 entitled *The Conservation Status of* Sorbus *in the UK* were published by the Royal Botanic Gardens Kew (ed. A. Jackson and M. Flanagan) in February 1998. Philip Nethercott contributed an important paper (Conservation Status of *Sorbus* in the Avon Gorge) referring to the very rare endemic species for which the Gorge is famous, most notably *Sorbus wilmottiana* and *S. bristoliensis*. *The World List of Threatened Trees*, compiled in a world-wide collaborative survey of endangered tree species over three years, was published on 25 August 1998. Nearly 9000 species are considered globally threatened and almost 1000 'critically endangered'. A short television programme on BBC1 News West (25 August) referred to the Avon Gorge *Sorbi*, as did national and local newspapers on the next day. Several newspaper reports noted the eleven species of trees at risk in Britain; all are members of the genus *Sorbus*, which also includes the commoner and well-known Rowan (*S. aucuparia*), Common Whitebeam (*S. aria*) and Wild Service-tree (*S. torminalis*). Four of the rare species are present in the Avon Gorge. Known only from here is the greatest rarity *S. wilmottiana*, with only some 20 specimens. This species was named by E.F. Warburg in honour of A.J Wilmott who earlier named *S. bristoliensis,* of which there are some 100 specimens, all confined to the Gorge. The other two Avon Gorge endemic *Sorbus* rarities are *S. anglica* (English Whitebeam) and *S. eminens*, but both of which occur elsewhere. Reference is made to all four Avon Gorge rare *Sorbi* in the *British Red Data Books: 1 Vascular Plants*, 3rd edition, 1999, ed. M.J. Wigginton, Peterborough: Joint Nature Conservation Committee.

A paper by Dr J.H. Davie, J.R. Akeroyd and D.H. Thompson, entitled 'Progressive plant invasion and colonization of an area adjacent to ancient woodland at Edford Wood, Somerset, England', (*Botanical Journal of the Linnean Society*, 1998, Vol. **128**, pp. 87-98), discusses the relation between the ancient and secondary vegetation of this 16-hectare Mendip wood near Holcombe. The flora of the ancient woodland includes Monk's-hood (*Aconitum napellus* ssp. *napellus*), Herb-Paris (*Paris quadrifolia*) and Solomon's-seal (*Polygonatum multiflorum*) as well as a large population of the hybrid between Water and Wood Avens (*Geum* × *intermedium*). An aerial photograph of the wooded area, taken by the Luftwaffe in September 1940, gives 'a vivid glimpse of a vanished world' (*vide* Rackham, O., 1986, *The History of the Countryside*, London: Dent).

Dr Lewis C. Frost, Lecturer in Genetics in the Department of Botany of the University of Bristol from 1957 until his retirement, died at the age of 72 on 16 June 1998. He was much involved in nature conservation, his efforts and extensive work with Dr David E. Coombe of Cambridge leading to the declaration of substantial parts of the Lizard Peninsula, Cornwall, as National Nature Reserves and Sites of Special Scientific Interest. At Bristol, Lewis Frost took considerable interest in the Adder's-tongue Spearwort (*Ranunculus ophioglossifolius*) at Badgeworth. His paper on 'The study of *Ranunculus ophioglossifolius* and its successful conservation at the Badgeworth Nature Reserve, Gloucestershire' is in *The Biological Aspects of Rare Plant Conservation*, 1981, ed. H. Synge, Chichester: Wiley. An earlier article with M.J. Dring on the same topic is in *Biological Conservation*, 1971, Vol. **4**, pp. 48-56. Dr Frost was also instrumental in much investigation of the rare plants of the Avon Gorge. His Avon Gorge Appeal Fund financed many studies of the rarities, published in a considerable succession of *The University of Bristol Avon Gorge Reports* (see e.g. 'Bristol Botany in 1993', p. 36). A joint article on species of *Allium* in the Avon Gorge was issued in *Watsonia* (see 'Bristol Botany in 1991', p. 29).

Names of contributors associated with several records are abbreviated thus:
**PJC** P.J. Chadwick. **RSC** R.S. Capper. **IPG** I.P. Green **PRG** P.R. Green
**JM** J. Martin **PJMN** P.J.M. Nethercott

The area covered by this report is essentially that defined by J.W. White for his *Flora of Bristol* (1912). The eastern boundary is taken as the old boundary of Wiltshire where it meets the old boundaries of both Gloucestershire and Somerset. The southern limit is taken as approximately the course of the River Brue along some of its length. The area comprises the northern part of the Watsonian vice-county of North Somerset (v.c. 6) and the southern part of West Gloucestershire (v.c. 34). In the following records these parts are designated **S** and **G** respectively.

Plant names are in accordance with C. Stace *New Flora of the British Isles*, 2nd edition, 1997.

*Helleborus viridis* L. Green Hellebore. A patch by stream in Budding's Wood, south of Portbury, **S**, PRG. J.W. White in the *Flora of Bristol*, 1912, p. 127, refers to probably this site as 'Steep overgrown bank of a stream on a wood-border above Portbury; fine and plentiful', but the plant has apparently not been recorded since that time.

*Aquilegia vulgaris* L Colombine. A few plants of this frequent escape, by path in old quarry, Sandford Hill, **S**, RSC.

*Thlaspi arvense* L. Field Penny-cress. Several plants, Monk Moor, north of Wedmore Moor, **S**, RSC.

*Viola canina* L, Heath Dog-violet. In 1970 a pure white form in short turf on drove immediately south of the course of the old railway at Shapwick, **S**, C.G. Trapnell. J.W. White (*Flora of Bristol*, 1912, p. 177) refers to a pure white form on Walton Heath, near Glastonbury, cultivated by Clark from turf-moor seed in 1822. E.S. Marshall (*A Supplement to the Flora of Somerset*, 1914, p. 29) also notes forma *alba* on the peat moor, near Shapwick.

*Cerastium pumilum* Curtis. Dwarf Mouse-ear. Flowering well in short turf at top of old quarry, Emborough, **S**, RSC. Also *C. diffusum* Pers. (Sea Mouse-ear).

*Minuartia hybrida* (Vill.) Schischk. Fine-leaved Sandwort. Flowering in good quantity in short grassland at top of quarry, Emborough, **S**, RSC.

*Geranium rotundifolium* L. Round-leaved Crane's-bill. Single plant on roadside, Mangotsfield, **G**, RSC.

*Trifolium glomeratum* L. Clustered Clover. Ellenborough Park, Weston-super-Mare, **S**, PRG. This is a first record for v.c. 6.

*Lathyrus sylvestris* L. Narrow-leaved Everlasting-pea. Well established on old railway track east of King's Wood, Axbridge, **S**, PJMN.

*Rosa rubiginosa* L. Sweet-briar. Single bush on grassy roadside bank, Mangotsfield, **G**, RSC.

*Euphorbia platyphyllos* L. Broad-leaved Spurge. A few fine plants in wheat field, Bonnyleigh Hill, near Beckington, **S**, RSC.

*Andromeda polifolia* L. Bog-rosemary. Some further light has been shed by Dr Francis Rose (*in litt.* 1999) on the questioned 1970 record of this plant by J.K. Hibberd on Westhay Moor (ST452437) in the Somerset Levels (see 'Bristol Botany in 1970', p. 17 and 'Bristol Botany in 1989', p. 36). Dr Rose writes that he visited this site (and neighbouring ones) with John K. Hibberd, then his postgraduate student, on 17 August 1969 and looked especially for *A. polifolia* and *Vaccinium oxycoccos*, finding neither. In a careful search of the area, some of the damper parts (where *A. polifolia* might have persisted) were examined closely by Dr Rose and bryophytes listed (see records under this heading at the end of this paper). It consequently seems very unlikely that J.K. Hibberd could have subsequently found *A. polifolia* in some six of twenty-five *randomly-placed* quadrats, and this record may be best assumed to be in error. Confusion of tiny amounts of vegetative *Salix repens* with *A. polifolia* in

most of the quadrats is a possibility. However, with *A. polifolia* reported to be 'in full flower', when confusion could be ruled out, it is not impossible that it was present in at least one quadrat (its long persistence in peaty sites elsewhere is known).

*Vaccinium oxycoccos* L. Cranberry. Last seen, fruiting well, on Blackdown, **S**, on 7 September 1969, PJMN. All later visits by PJMN over the years, the most recent on 7 August 1998, yielded no trace of the plant. There have been vegetation changes in the site although *Sphagnum palustre* L. is still present. This site is the locality last recorded by the Sandwiths in 1957 ('Bristol Botany in 1957', p. 346). The Cranberry appears to be now lost from Blackdown.

*Gentianella amarella* (L.) Börner Autumn Gentian. A good colony in turf, Callow Hill, Mendips, **S**, RSC.

*Symphytum tuberosum* L. Tuberous Comfrey. Several clumps in small plantation, Failand, **S**, IPG. It was reported from here in 1912.

*Myosotis discolor* Pers. Changing Forget-me-not. Damp meadow, Winscombe, **S**, RSC.

*Verbascum nigrum* L. Dark Mullein. One large flowering and fruiting plant on grass verge by car park, Winscombe, **S**, RSC.

*Linaria repens* (L.) Mill. Pale Toadflax. Many plants on disturbed ground at edge of field, near road, Lawrence Weston Road area, Avonmouth, **G**, PJMN.

*Orobanche minor* Sm. Common Broomrape. One flowering spike by towpath, Leigh Woods, Bristol, **S**, RSC.

*O. hederae* Duby Ivy Broomrape. Flowering well around margin of Ellenborough Park and at the top of Grove Park, Weston-super-Mare, **S**, RSC.

*Ballota nigra* L. Black Horehound. A few plants, Cross Plain, near Axbridge, **S**, PJMN. Commoner on adjacent Wavering Down.

*Valerianella locusta* (L.) Laterr. Common Cornsalad. A few plants in flower and fruit near old railway line, Emborough, **S**, RSC.

*Ornithogalum pyrenaicum* L. Spiked Star-of Bethlehem. A small colony at edge of cleared path of the Nunney Brook, south of Nunney, **S**, IPG. Last seen in this area by the late Captain R.G.B. Roe in 1954 at Nunney Catch.

*Ophrys apifera* Hudson Bee Orchid. A few spikes on both sides of the A432 near Mangotsfield, **G**, RSC. Over fifty flower spikes, Shute Shelve, **S**, PJC.

*O. sphegodes* Mill. Early Spider-orchid. A single spike, in turf near Dursley, **G**, Dr G.H.J. Meredith. This is the locality from which this orchid was first reported as new to Gloucestershire in 1975 ('Bristol Botany in 1975' p. 19). It was known to flower again in 1976 ('Bristol Botany in 1976', p. 25) but has not been seen in this site since 1985. The sporadic flowering of many species of orchids is well known; the continued existence of *O. sphegodes* in Gloucestershire is much to be welcomed.

*Anacamptis pyramidalis* (L.) Rich. Pyramidal Orchid. Only about a dozen flower spikes compared with over eighty in 1997, Toll Down Farm, north of West

Littleton, G, PJC. Flowering on both sides of the A432 near Mangotsfield, **G**, RSC.

*Carex vesicaria* L. Bladder-sedge. A large stand, Blagdon Lake, **S**, Miss A.P. Pockson.

*C. lasiocarpa* Ehrh. Slender Sedge. About fifty fruiting spikes in a sedge often remaining vegetative, Street Heath, **S**, RSC.

*Parapholis incurva* (L.) C.E. Hubb. Curved Hard-grass. Several patches along raised wall of River Brue, Burnham-on-Sea, **S**, RSC.

**ALIENS**

*Hirschfeldia incana* (L.) Lagr.-Foss. Hoary Mustard. Occasional roadside plant, St Andrew's Road, Avonmouth, **G**, PJMN.

*Rorippa austriaca* (Crantz) Besser Austrian Yellow-cress. A number of sizeable, dense roadside colonies near Avonmouth Road, Smoke Lane, Burcott Road and Lawrence Weston Road (west of St Andrew's Road Station and Hallen Marsh Junction on the railway line), **G**, PJMN. The Avonmouth-Lawrence Weston area is now heavily industrialised or zoned (with sewage works, refuse tip and car park). This crucifer was first recorded from the Bristol area in 1974 from a lane leading to Hoar Gout ponds, near Avonmouth ('Bristol Botany in 1974', p. 19) and to have subsequently spread considerably in this area ('Bristol Botany in 1977', p. 27). It seems now to have increased its range further. It is of interest that this plant is included in the *British Red Data Book: Vascular Plants*, 1st edition, 1977, and 2nd edition, 1983, but is not in the 3rd edition, 1999, being excluded as an alien species. The plant from an old rubbish tip, Lawrence Weston, was painted in 1980 by the late Miss Florence Gravestock (see illustration).

*Hypericum calycinum* L. Rose-of-Sharon. Large patch naturalised on grassy bank, Beckington, **S**, RSC.

*Amaranthus albus* L. White Pigweed. Several plants on track leading to Common Hill Wood, Walton-in-Gordano, **S**, IPG. Also plentiful *A. retroflexus* L. (Common Amaranth), B. Collins.

*Geranium endressii* J. Gay French Crane's-bill. Established in grassland (from nearby garden) along old railway track, Winscombe, **S**, PJMN.

*Lathyrus latifolius* L. Broad-leaved Everlasting-pea. Leigh Woods, Bristol, **S**, RSC.

*Calystegia pulchra* Brummitt & Heywood Hairy Bindweed. Established, probably a garden escape, on old railway track, Winscombe, **S**, PJMN.

*Solanum physalifolium* Rusby Green Nightshade. One plant on track leading to Common Hill Wood, Walton-in-Gordano, **S**, IPG.

*Phacelia tanacetifolia* Benth. Phacelia. On stony bank, Rushmead Lane, Marshfield, **G**, PJC, det. Sylvia Kelly.

*Acanthus spinosus* L. Spiny Bear's-breech. Several clumps on disused railway at Southfield, Radstock, **S**, JM.

*Rorippa austriaca* (Austrian Yellow-cress) Painted by the late Miss I.F. Gravestock (original in BNS archives).

*Campanula portenschlagiana* Schult. Adria Bellflower. Established on roadside wall, Goodeve Road, Sneyd Park, Bristol, **G**, PJMN.

*C. poscharskyana* Degen Trailing Bellflower. With *C. portenschlagiana* on roadside wall, Goodeve Road, Sneyd Park, Bristol, **G**, PJMN. Both species have been reported together at Portishead ('Bristol Botany in 1993', p. 45) and, although much under-recorded, may be increasing garden escapes (P.R. Green *et al.*, *Atlas Flora of Somerset*, 1997, p. 176).

*Cyperus eragrostis* Lam. Pale Galingale. Several plants on track from Warren House to Goblin Combe, Cleeve, **S**, JM.

*Eragrostis cilianensis* (All.) Vignolo ex Janch. Stink-grass. Several plants on grassy centre of track leading to Common Hill Wood, Walton-in-Gordano, **S**, IPG, conf. R.M. Payne. Also several plants of *Panicum capillare* L. (Witch-grass), *Setaria pumila* (Poir.) Schult. (Yellow Bristle-grass) and *S. viridis* (L.) P. Beauv. (Green Bristle-grass).

## BRYOPHYTES

On a visit to Westhay Moor (see entry under *Andromeda polifolia*) in August 1969 the following bryophytes were listed by Dr Francis Rose. Mosses included *Sphagnum papillosum* Lindb., *S. subnitens* Russ. & Warnst. and *S. recurvum* P. Beauv. (all locally abundant) and in pools *S. auriculatum* Schimp. and *S. cuspidatum* Hoffm. Also present were *Polytrichum commune* Hedw., *Aulacomnium palustre* (Hedw.) Schwaegr., *Drepanocladus fluitans* (Hedw.) Warnst. and *Calliergon stramineum* (Brid.) Kindb. Hepatics growing on *Sphagnum* or on moist peat noted were *Riccardia latifrons* (Lindb.) Lindb., *Lophozia ventricosa* (Dicks.) Dum., *L. incisa* (Schrad.) Dum., *Mylia anomala* (Hook.) S. Gray, *Cephalozia bicuspidata* (L.) Dum., *C. connivens* (Dicks.) Lindb., *C. lunulifolia* (Dum.) Dum., *Kurzia pauciflora* (Dicks.) Grolle, *Calypogeia muellerana* (Schiffn.) K. Muell. and *C. fissa* (L.) Raddi.

The list includes five mosses classed in A Bryophyte Flora of North Somerset (J. Appleyard, 1970, *Transactions of the British Bryological Society*, **6**, 1-40) as very local and four hepatics classed as very rare. The record of *Mylia anomala* appears to be the first for Westhay Moor, although recorded from Meare Heath in 1942 by Mrs C.I. Sandwith. Also *Cephalozia lunulifolia* is a first record for Westhay Moor, but recorded for Street Heath in 1947 by Mrs C.I. Sandwith. Records by Mrs C.I. Sandwith and N.Y. Sandwith for Westhay Moor in the period 1942-1954 include a number of the very rare and less common bryophytes recorded by Dr Rose in 1969, suggesting rather little change in bryophyte representation over this period.

## ACKNOWLEDGEMENTS

I thank everyone who has supplied records and helped with these, especially Mr I.P. Green, Mr M.A.R. Kitchen and Mr P.J.M. Nethercott. I am indebted by Mr D.J. Lovell of Long Ashton Research Station for meteorological records.

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# THE LATE TRIASSIC STRATA OF MANOR FARM, AUST, SOUTH GLOUCESTERSHIRE

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**Abstract**. A field meeting was held at Manor Farm, Aust, to inspect temporary exposures of late Triassic (Norian-Rhaetian) strata at close hand. The exposed sequence is closely comparable to that of the nearby Aust Cliff section. Many fossils were recovered from various levels of the Penarth Group (Rhaetian), including reptile and fish remains from the Ceratodus Bone Bed, and a variety of bivalves from the Westbury Formation shales and Cotham Member limestones. Several types of trace fossils were noted. The "Cotham Marble" at the top of the Cotham Member here comprises the usual mud-flake breccia and stromatolitic varieties and a *Modiolus*-rich biomicrite lithology.

The late Triassic sequence of the Aust area, South Gloucestershire, records the presence of arid or semi-arid coastal sabkha environments (Mercia Mudstone Group; Norian-early Rhaetian), overlain by a fossiliferous, shallow marine and lagoonal facies, comprising the mid to late Rhaetian Penarth Group. The highest Rhaetian sediments in the region are pale grey-brown bioclastic limestones and calcareous mudstones of Lias lithology, known as the Pre-planorbis Beds. These contain an abundant benthic marine fauna, but lack ammonites. The first occurrence of ammonites (*Psiloceras*) marks the base of the Hettangian Stage of

the Jurassic System. Stratigraphic terminology used in this account is adapted from that of Warrington *et al* (1980) and Donovan & Kellaway (1984).

Extensive temporary exposures were recently created at Manor Farm, Aust, South Gloucestershire (ST574896), to provide construction materials for the new Severn bridge and associated works. These currently (summer 1997) provide sections from the top of the Mercia Mudstone Group (unnamed red-brown mudstones and Blue Anchor Formation; formerly the Tea Green Marl), through the Penarth Group (Westbury Formation and Cotham Member of the Lilstock Formation), up into the Pre-planorbis Beds of the Blue Lias (Fig. 1). This replicates the highest part of the Aust Cliff section (approximately 800m to the west; ST5689); figured for instance by Kellaway & Welch (1993, plate 10) and described on numerous occasions since the initial account of Buckland & Conybeare (1824). Relatively recent accounts include those of Reynolds (1947), Welch & Trotter (1961) and Hamilton (1977). Aust Cliff is internationally renowned for the mixed terrestrial-aquatic vertebrate fauna of the lenticular Ceratodus Bone Bed, marking the transgressive base of the Westbury Formation. In addition, numerous invertebrates occur. (Rendle Short, 1904; Reynolds, 1947; Hamilton, 1977; Storrs, 1994). Much of the Aust Cliff section is inaccessible, and fossil hunting relies on fallen blocks from the various Penarth Group lithologies and Pre-planorbis Beds. The new sections at Manor Farm consequently provide an opportunity to record these highly fossiliferous strata at close hand, in a fresh state, and to place *ex situ* finds from Aust Cliff in a clear stratigraphic context.

This paper is an account of a joint Field Meeting of the Bristol Naturalists' Society Geological Section and Bath Geological Society on 14 July 1996. Forty members assembled at a vantage point above the northernmost quarry at 2.30 pm, in warm humid weather. From here, the major stratigraphic units were easily distinguished, due to their distinctive and contrasting colouration (Fig. 2). The partly-flooded quarry floor exposed up to about a metre of 'Keuper Marl'

(unfossiliferous, blocky, brick-red silty mudstone), with the Blue Anchor Formation (chiefly tough, green-grey, silty mudstones; approximately 3m in thickness) forming sloped banks above. The Norian-Rhaetian boundary is currently taken to lie within this latter unit (Kellaway & Welch, 1993), which includes a conspicuous 20cm muddy sandstone marker band (Figs 1, 2), also seen at Aust Cliff (Reynolds, 1947; Hamilton, 1977). Overlying grey-black sediments comprise cyclic shales, thin fossiliferous sandstones and tabular muddy bioclastic limestones of the transgressive Westbury Formation (circa 3.5m in thickness), followed by a further pronounced upward change to the cream-coloured marls and fine-grained limestones of the Cotham Member (circa 3m in thickness). The Langport Member ('White Lias') of the Lilstock Formation is absent here as at Aust Cliff, and the highest strata preserved in the quarry brow and subsoil comprise the distinctive flaggy brown-grey bioclastic limestones and mudstones of the Pre-planorbis Beds, resting non-sequentially upon the Cotham marls and limestones (Fig. 1). The position of the Ceratodus Bone Bed was pointed out, seen as discontinuous lenses occupying shallow depressions in the eroded top of the Blue Anchor Formation.

After spending several minutes viewing the variegated stratigraphy, members were invited to inspect a series of vertebrate and invertebrate fossils, collected previously from the site by the authors (discussed in appropriate sections below). The party then proceeded to the quarry floor, to inspect the red mudstones, and junction with the overlying grey-green Blue Anchor Formation. Selenite specimens were collected from the Blue Anchor Formation, and it was pointed out that the relatively abrupt upward colour change from red to grey-green, was attributed by Hamilton (1977) to chemical reduction of iron oxides, during deposition of the overlying organic-rich Westbury Formation muds. The massive muddy sandstone bed within the Blue Anchor Formation (see above) was clearly visible around the lower level of the quarry, and was available for inspection as loose blocks (Fig. 2).

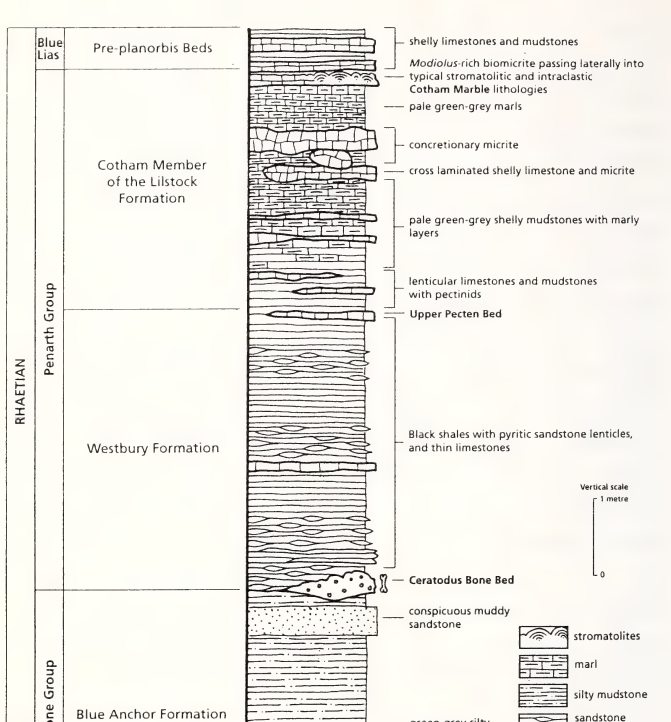


Figure 1. Generalised stratigraphy of late Triassic strata (Mercia Mudstone Group up to basal Lias) exposed at Manor Farm, Aust, South Gloucestershire (ST574896).

Figure 2. General view of part of northern quarry, Manor Farm, Aust, South Gloucestershire (ST574896). Lower face exposes dark shales, lenticular fossiliferous sandstones and limestones of the Westbury Formation, with a bioclastic limestone marker bed at the top (Upper Pecten Bed) forming a jagged overhang. The higher face exposes cream-coloured marls and micrites of the Cotham Member, whilst the Cotham Marble and basal Lias limestones have been cleared back into tip heaps, seen in the top right of the photograph. *Ex situ* tabular blocks in the bottom of the quarry have been excavated from the sandstone marker bed within the Blue Anchor Formation. The combined height of both faces is approximately 6m.

The group then proceeded to a long face in the Westbury Formation along the southern edge of the quarry (Fig. 2). A small section had been excavated at one point to expose a lens of Ceratodus Bone Bed, approximately 20cm thick. As at Aust Cliff, it comprises derived clasts of grey-green Blue Anchor Formation mudstone, occasional quartz pebbles and incomplete to complete bones, teeth, fish scales and coprolites, in a well-cemented matrix of comminuted bone and shelly quartz sand. Earlier during the meeting (see above), members had been shown an unusually large centrum of an ichthyosaur vertebra, a fragmentary propodial of a

plesiosaur, a vertebra possibly attributable to a theropod dinosaur, coprolites and shark fin spines, all from this horizon. This unusual mix of terrestrial and aquatic elements had given rise to some discussion. Storrs (1994) envisaged accumulation of an essentially autochthonous marine fauna with subordinate terrestrial debris in a shelf setting, followed by a shoreward storm surge, concentrating skeletal debris and rip-up clasts of Blue Anchor Formation mudstone, as a rapidly-deposited 'tempestite'. Earlier, attention had also been drawn to a specimen of the bone bed, containing a concentration of articulated, closed, spar-filled bivalves, which although generically indeterminate, have the general appearance of shallow burrowers. Given the susceptibility of such bivalves to reworking and disarticulation (Tanabe & Arimura, 1987), these indicate physical exhumation from offshore substrates, followed by rapid and ultimately lethal burial in an unfamiliar sedimentary medium. This, and other molluscan biostratinomic features in the bone bed, (variable orientations and nesting/stacking of disarticulated shells) support Storrs' notion of rapid deposition (Kidwell & Bosence, 1991).

Members spent some time collecting from loose blocks, which yielded centra of plesiosaur vertebrae, fragments of reptilian ribs, shark fin spines and a jaw fragment of *Severnichthys acuminatus* (Agassiz) (a large carnivorous osteichthyan fish). In addition, abundant coprolites, poorly preserved recrystallised disarticulated bivalves (including *Mytilus cloacinus* Tutcher), and a small quartz clast were noted.

Slabs of the overlying black shale displayed plasters of disarticulated, dominantly convex-up crushed bivalves including *Rhaetavicula contorta* (Portlock). Thin lenticular micaceous sandstones associated with the shales yielded euhedral pyrite crystals, and displayed pavements of mouldic, disarticulated, convex-up bivalves (including current-aligned *Pleurophorus elongatus* Moore) and scattered vertebrate remains. Amongst the latter, a *Severnichthys* tooth and a vertebral process attributed to *Pachystropheus rhaeticus* E. von Huene (an enigmatic

diapsid reptile; Storrs, Gower & Large, 1996) were collected. Mr. J. R. Parkins discovered a small sandstone slab exhibiting examples of the trace fossil *Archarenicola rhaetica* Horwood, described by Horwood (1912) from the Westbury Formation of Leicestershire, English Midlands, and interpreted as a soft-bodied annelid, similar to the present day lug-worm *Arenicola*. Dr. John Pollard (pers. comm.) reinterprets the structure as a collapsed worm tube exhibiting strong external annulations.

Earlier in the meeting, attention had been drawn to well-preserved bivalve resting traces (*Lockeia siliquaria* James), preserved as casts on the base of a pyritic sandstone slab, weathered from a sandstone lens within the lower part of the shale sequence. These closely match examples figured as *Pelecypodichnus* from the Westbury Formation of Staffordshire, English Midlands, by Wright & Benton (1987). On one part of the slab, a short 'chain' of these casts was tentatively interpreted as a crawling trace. These are accordingly best classified as *Lockeia serialis* Seilacher & Seilacher, following A. & E. Seilacher (1994). The upper surface of the sandstone fragment preserves occasional, small, disarticulated, convex-up bivalves, including *Eotrapezium* cf. *concentricum* (Moore). Shallow infaunal bivalves such as these may have produced the traces.

A laterally-persistent unit of tough, muddy, dark grey, rusty weathering bioclastic limestone, approximately 8cm thick occurs near the top of the Westbury Formation and is probably equivalent to the Upper Pecten Bed of Aust Cliff (Reynolds, 1947). The upper surface displays abundant disarticulated *Chlamys valoniensis* (Defrance), sometimes accompanied by *R. contorta*. Internally, the unit largely comprises an admixture of mud-grade sediment and compacted shell debris, with localised concentrations of small, articulated spar-filled bivalves. As in the basal bone bed (see above), the latter indicate that at least parts of this unit were rapidly deposited.

This limestone is overlain by about 80cm of grey shelly clay with some cemented bands, becoming increasingly marly towards the top. *C. valoniensis* is especially abundant in the lower part. Reynolds (1947) took the equivalent of this bed at Aust Cliff (band 8 of his account) as the highest unit of the Westbury Formation. At Manor Farm, lenticular developments of tough grey 'pecten limestone' with *C. valoniensis* occur in the lower part of the unit, and are lithologically similar to the lower, laterally persistent bed (see above). The undersides of some of these lenses, exposed as loose slabs, displayed irregular pod-shaped to sinuous casts, tentatively interpreted as remnants of crustacean burrow systems. Nearby, spoil tips of the grey shelly clay yielded common fish vertebrae.

A higher face exposed pale-coloured marls of the Cotham Member, with some beds of chalky, micritic, tabular to nodular limestone approximately 1.4m above the base (insect bed; band 10 of Reynolds, 1947). Loose blocks of the latter yielded scattered casts of *Tutcheria cloacina* (Quenstedt) and *C. valoniensis*. Mr. S. Carpenter has previously recovered ichthyosaur and plesiosaur vertebrae, a coprolite and a probable theropod phalange from these sediments.

The highest levels of the Cotham Member and the overlying Pre-planorbis Beds were inspected along the northern face of the exposure, where a small excavation had been dug, to demonstrate the stratigraphic relations of the stromatolitic 'landscape marble', occurring at the top of the member (Hamilton, 1961). Here, this layer is up to 15cm thick, and rests on soft, unfossiliferous, khaki-coloured mudstone. Loose blocks of 'crazy' Cotham Marble (intraformational micrite-flake breccia, see above) were found nearby, and probably represent channel-fills between the algal 'heads' (Reynolds, 1947; Hamilton, 1961). In some specimens mud-flake breccia is clearly overlain by stromatolitic growths, whilst in others it is intercalated with splintery cream-weathering micrite, packed with small, disarticulated *Modiolus* cf. *hillanus* (J. Sowerby). Members had been earlier

shown a block of 'crazy' Cotham Marble, containing abundant minute spar-filled articulated bivalves, packed into interstices between the intraclasts.

The landscape marble is overlain by the tough flaggy limestones and weathered brown mudstones of the Pre-planorbis Beds, from which it is locally separated by a thin veneer (up to 4cm) of unfossiliferous brown mudstone. The limestones are full of disarticulated bivalves, including *Liostrea hisingeri* (Nilsson), *Pteromya tatei* (Richardson & Tutcher), with rarer *Oxytoma longicostata* Tutcher and *Modiolus minimus* (J. Sowerby). Minute echinoid spines stud the surfaces of some slabs, and an ichthyosaur vertebra has been recovered from this level by Mr S. Carpenter. Associated mudstones are also rich in *L. hisingeri*. Members spent some time collecting fragments of the various Cotham "marbles", before dispersing at 5.30pm.

A representative selection of lithological specimens and fossils from this locality has been accessioned into the geological collections of the Bristol City Museum & Art Gallery.

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Hugh Ivimey-Cook is thanked, for comments on an early draft of this account. Gratitude is also expressed to John Pollard of the University of Manchester, for supplying information on *Archarenicola*. Mr. M.P. Chevin of RMC Roadstone Ltd (Western) kindly gave permission for the field meeting to take place.

## REFERENCES

Buckland, W. & Conybeare, W.D. (1824). Observations on the South-western Coal District of England. *Transactions of the Geological Society, Second Series*, **1**, 210-316.

Donovan, D.T. & Kellaway, G.A. (1984). *Geology of the Bristol district: the Lower Jurassic rocks.* Memoir of the British Geological Survey, HMSO, London.

Hamilton, D., (1961). Algal growth in the Rhaetic Cotham Marble of Southern England. *Palaeontology*, **4,** 324-333.

Hamilton, D. (1977). Aust Cliff . Pp. 110-118 in (Savage, R.J.G.; ed.) *Geological Excursions in the Bristol District.* University of Bristol.

Horwood, A.R. (1912). On *Archarenicola rhaetica*, sp. nov. *Geological Magazine*, **9,** 395-399.

Kellaway, G.A. & Welch, F.B.A. (1993). *Geology of the Bristol district.* Memoir of the British Geological Survey, HMSO, London.

Kidwell, S.M. & Bosence, D.W.J. (1991). Taphonomy and time-averaging of marine shelly faunas. Pp. 115-209 in (Allison, P.A. & Briggs, D.E.G.; eds) *Taphonomy: releasing the data locked in the fossil record.* Plenum Press, New York.

Rendle Short, A. (1904). A description of some Rhaetic sections in the Bristol district, with considerations of the mode of deposition of the Rhaetic Series. *Quarterly Journal of the Geological Society, London*, **60,** 170-193.

Reynolds, S.H. (1947). The Aust section. *Proceedings of the Cotteswold Naturalists' Field Club*, **29,** 29-39.

Seilacher, A. & Seilacher, E. (1994). Bivalvian trace fossils: a lesson from actuopalaeontology. *Courier Forschungsinstitut Senckenberg*, **169,** 5-15.

Storrs, G.W. (1994). Fossil vertebrate faunas of the British Rhaetian (latest Triassic). *Zoological Journal of the Linnean Society*, **112,** 217-259.

Storrs, G.W., Gower, D.J. & Large, N.F. (1996). The diapsid reptile, *Pachystropheus rhaeticus,* a probable choristodere from the Rhaetian of Europe. *Palaeontology*, **39,** 323-349.

Tanabe, K. & Arimura, E. (1987). Ecology of four infaunal bivalve species in the Recent intertidal zone, Shikoku, Japan. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **60,** 219-230.

Warrington, G., Audley-Charles, M.G., Elliott, R.E., Evans, W.B., Ivimey-Cook, H.C., Kent, P.E., Robinson, P.C., Shotton, F.W. & Taylor, F.M. (1980). *A correlation of Triassic rocks in the British Isles*. Geological Society of London, Special Report 13.

Welch, F.B.A. & Trotter, F.M. (1961). *Geology of the country around Monmouth and Chepstow.* Memoir of the Geological Survey of Great Britain, HMSO, London.

Wright, A.D. & Benton, M.J. (1987). Trace fossils from Rhaetic shore-face deposits of Staffordshire. *Palaeontology*, **30,** 407-428.

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# A RECENT EXPOSURE OF THE TYPE LOCALITY OF THE LOWER SILURIAN DAMERY BEDS OF THE TORTWORTH INLIER, SOUTH GLOUCESTERSHIRE

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## SUMMARY

The type locality of the Lower Silurian Damery Beds was briefly described in 1901. A new excavation of the old Damery Stables quarry, in late 1995, provided an excellent exposure that has been logged and described.

## INTRODUCTION

The Tortworth Inlier lies in the south of Gloucestershire and in the northern part of the new county of South Gloucestershire and is composed of about 25 square kilometres of Lower Palaeozoic rocks. While the northern half of the Inlier is composed of Ordovician beds, the Silurian rocks of the southern half have attracted most attention from researchers. The distribution of the Silurian rocks of the Inlier and the position of the type locality of the Damery Beds are shown in Fig. 1 which is based on Curtis (1972) and Cocks *et al* (1992) and Fig. 2 which is based on Siveter *et al* (1989).

The purpose of this paper is to describe the type locality of the Damery Beds (ST 7055 9430) in detail. This was not possible until a new excavation was made on private land which exposed about 4.4 metres of the beds and which is now obscured by concrete walling. The new exposure is also compared with the descriptions made by earlier workers.

## THE GEOLOGY

The major marine transgression during the late Llandovery has been widely described (Bridges, 1975: Hurst *et al* 1978: Cocks *et al* 1984; Siveter *et al*, 1989). Prior to this transgression the English midlands and the Bristol Channel and South

West England were mostly land. The transgression flooded the Midlands landmass, but left the southern coastline at a similar location (Fig. 2).

The sequences exposed in the Tortworth Inlier consist of upper Llandovery and lower Wenlock sediments that are different from those to the north in the Welsh Borderlands. They indicate that deposition was close to land with sediment being supplied through much of Llandovery time from a southerly to south-easterly source (Cocks *et al* 1984). Some beds contain a significant micaceous component which may indicate renewed erosion of a distal metamorphic source to the south, although for the most part these sediments appear to represent reworked Palaeozoic rocks from a topographic high called Pretannia (Cope & Bassett, 1987).

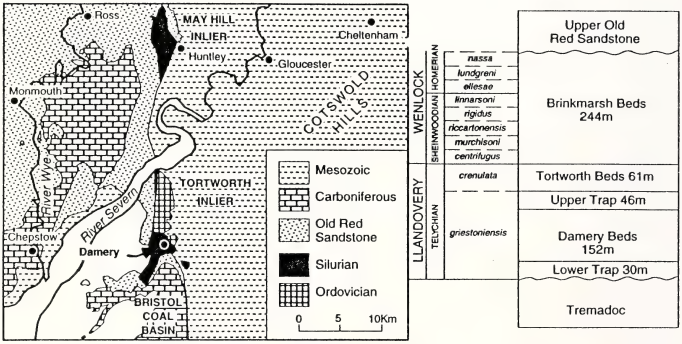


Figure 1 Geology of the area around the Tortworth Inlier, showing the location of the Damery Stables quarry, including a summary of the stratigraphy of the southern part of the Inlier. Based on Curtis (1972) and Cocks *et al* (1992).

## THE DAMERY BEDS

The Damery Beds are poorly exposed throughout the Inlier. The type locality is the valley of the Little Avon River near Damery Bridge although the once well exposed road cutting 50 metres south of the bridge (ST 7057 9427) is now grown over (Curtis, 1972). Benton and Hiscock (1996) examined the cutting by digging two trenches but no rocks are now visible.

The Damery Beds were dated (Cocks *et al* 1984) by the presence of *Eocoelia curtisi*, *Stricklandia laevis* and *Pentameroides sp.* and assigned to the *griestoniensis* zone of the Telychian (Late Llandovery). They have been placed informally into three units, a lower sandstone division 40-60 metres thick, a middle argillaceous division up to 40 metres thick, and an upper, 70-100 metres thick of mixed sandstones and mudstones including a 25 metre cap of mudstone (Cave, 1977; Kellaway and Welch, 1993). The re-exposure described in this paper is near the middle of the sequence, but at a slightly lower horizon than the road cutting ten metres to the west (ST 7055 9430) (Curtis, 1972).

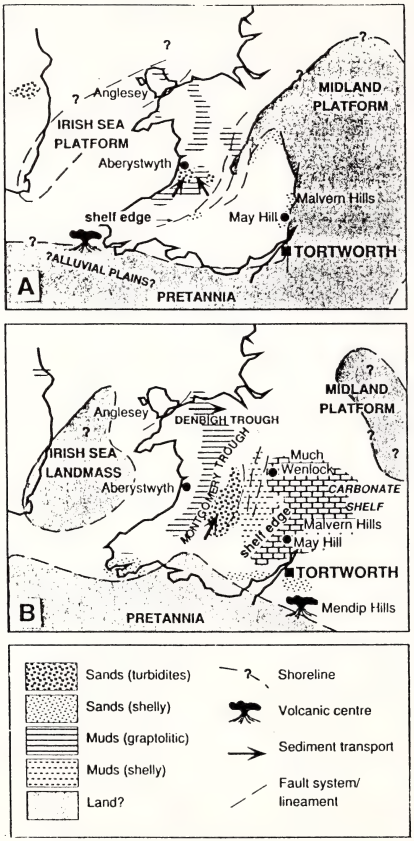


Figure 2. Palaeogeography of Wales and western England in (A) late mid-Llandovery (Telychian), and (B) late Wenlock (Homerian) times, showing the major eastwards marine transgression that occurred in the late Llandovery and early Wenlock, and the movements of the southern coastline across south Wales and the Tortworth area, with the possible location of Pretannia. (Cope & Bassett 1987). Based on Siveter *et al* (1989).

## DESCRIPTION OF THE EXPOSURE

### Earlier research

The old quarry, described by Morgan and Reynolds (1901) is 26 metres south of Damery Bridge (ST 7057 9430) and listed by Curtis (1972) as inaccessible. It is of interest for two reasons.

A) Morgan and Reynolds (1901) logged the beds in the section as follows:-

| | |
|---|---|
| Sandy limestone, highly fossiliferous | 4 inches |
| Shaly parting | 0.5 inch |
| Sandstone, becoming calcareous and highly fossiliferous below, the fossils being mainly converted into peroxide of iron | 24 inches |
| Shaly parting | 3 inches |
| False bedded flaggy strata | 5 inches |
| Shaly parting | 3 inches |
| Sandstone | 2 inches |
| Shale | 2 inches |
| Hard sandstone with two highly fossiliferous calcareous bands | 24 inches |
| Shale | 6 inches |
| Sandstone | 4 inches |
| Shale | 1.5 inches |
| Sandstone down to the base of the exposure | |

B) Ziegler (1965) recognised a series of five faunal communities which characterise environments progressively away from the shoreline, while Zeigler *et al* (1968) discussed the composition and structure of lower Silurian marine communities of which the second was the *Eocoelia* community. Significantly, the

site from where the specimens were collected is described as "behind a new building, 100 feet south of Damery Bridge near Tortworth, Gloucestershire". However, no detail is given of the nature of the exposure or the horizon where the specimens were found.

**Present research**

The excavation in the old quarry, previously degraded and heavily over-grown, exposed a new face 61 metres long, running WNW-ESE along the edge of a concrete apron at the rear of the new building. The maximum height is 4.4 metres sloping down in both directions to approximately 3.0 metres at the western end. At the eastern end, an old cesspit excavation, a concrete staircase and other work obstruct the beds and the true height.

Two sections were measured and the beds logged. Section A was 1.5 metres from the western end of the exposure, while Section B was ten metres from the western end at the point of maximum height. Both sections were very similar in the types and sequences of beds, with only minor details being different. Thus, in this paper, only Section B is systematically described and a schematic sedimentary log provided (Fig. 3).

**SYSTEMATIC DESCRIPTION OF SECTION B**

| Bed No | Thickness mm | Description |
|---|---|---|
| B44 | 250 | Soils with clasts of fine sandstone from underlying beds |
| B43 | 190 | Parallel bedded, fine, greenish, micaceous sandstone |
| B42 | 380 | Loose shales with random clasts of fine micaceous sandstone |
| B41 | Max 240 | Cross bedded, fine, hard greenish micaceous sandstone, stained red. Lensing out to west and east. Rugose corals located in irregular bands overlain by hard sandstone. |

| | | |
|---|---|---|
| | | Bioturbation on upper and lower surfaces. |
| B40 | 45 | Greenish micaceous mudstone, bioturbation on base. |
| B39 | Max 30 | Fine, reddish, micaceous sandstone with bioturbation on upper and lower surfaces. |
| B38 | Max 140 | Greenish (mottled red) fine, micaceous sandstone with brachiopod debris. Bioturbated matrix on top surface. Lenses out to east and west. |
| B37 | Max 80 | Parallel bedded, greenish, soft, micaceous mudstone, lensing out to west |
| B36 | Max 120 | Parallel bedded, green, fine sandstone. |
| B35 | 100-160 | Greenish, fine, micaceous sandstone with upper and lower highly fossiliferous 'rottenstone' bands. Flat bedded, thin sandstone base. Bioturbated top surface |
| B34 | 60 | Greenish to purplish micaceous mudstone |
| B33 | 35 | Greenish, hard, fine micaceous sandstone with rippled top surface and bioturbated base. |
| B32 a-c | 230 | Green, hard, fine sandstone with 40mm thick 'rottenstone' band at base, which is highly bioturbated, with brachiopod moulds. Parallel bedding with sparse fossil fragments above the 'rottenstone' band |
| B31 | 170 | Greenish brown micaceous siltstone. |
| B30 | 80 | Green/grey (mottled red) fine micaceous sandstone, with tool marks on the top surface and *Palaeophycus* on the bottom surface. Fine cross bedding throughout |
| B29 | 25 | Grey, hard, fine sandstone with bioturbated, rippled top surface with small *Palaeophycus*. Bioturbated base. |
| B28 | 115 | Parallel bedded highly micaceous fissile sandstone with top 15mm separated by a very thin sandy parting. |
| B27 | 10 | Bright red to yellow (particularly when wet) very soft clay layer. |

| | | |
|---|---|---|
| B26b | 40 | Green, fine, bedded sandstone with rippled top surface. Separated from B 26a by a soft thin sandstone parting |
| B26a | 270 | Flat bedded, green, hard, fine sandstone. Bottom 20mm fossiliferous. Soft sandy parting 165 mm from highly bioturbated base. |
| B25 | 75 | Greyish-red micaceous mudstone |
| B24b | 25 | Greenish (red-mottled) fine micaceous sandstone, with a thin mudstone drape on top surface. Well developed fine *Palaeophycus* on base |
| B24a | 25 | Green (red mottled) fine micaceous sandstone with rippled top surface. Generally parallel bedded but slight cross-bedding. Well developed fine *Palaeophycus* on base |
| B23 | 30 | Greenish micaceous siltstone |
| B22 | 305 | Green, calcareous, fine, micaceous sandstone crowded with fossils, mainly brachiopods. Highly bioturbated base with fossil moulds. |
| B21 | 60 | Brown/greenish micaceous bioturbated siltstone with interleaved coarser sand lenses. |
| B20 | 110 | Green, calcareous, highly fossiliferous fine sandstone with small rip-up clasts of green mudstone. |
| B19 | 25 | Purplish micaceous siltstone. |
| B18 | 30 | Cross-bedded, green, fine, micaceous sandstone showing bioturbation |
| B17 | 115 | Cross-bedded dull red, hard, micaceous sandstone, with strongly bioturbated top surface with *Palaeophycus*. Fossiliferous base (unidentified debris) with mudstone flakes in the bottom 20mm. |
| B16 | 70 | Greenish strongly bioturbated siltstone with mudstone flakes |

| | | |
|---|---|---|
| B15 | 25 | Reddish, micaceous, sandstone with strong bioturbation on top surface and large (up to 10mm diameter) *Palaoephycus* burrows. Mildly bioturbated base. |
| B14 | 15 | Greenish mudstone. |
| B13 | 20 | Reddish, fine, sandstone, in two layers separated by thin (1-2mm) green mudstone layer. Bioturbation on top surface and base, with large *Palaeophycus* burrows on base. |
| B12 | 20 | Cross bedded green micaceous siltstone. |
| B11b | 50 | Cross bedded, greenish/pink, hard, fine micaceous sandstone. Separated from B11a by thin (1mm) micaceous mudstone parting. |
| B 11a | 145 | As B11b. |
| B10 | 0-10 | Grey mudstone. |
| B9 | 20 | Current bedded, greenish (stained patchily red) fine micaceous sandstone. Rippled top surface. |
| B8 | 15 | Dark purple micaceous mudstone. |
| B7 | 20-80 | Green to red fine, micaceous sandstone. Top surface bioturbated, with flute casts and fossil moulds. In the bottom 15mm and top 5mm are many fossil moulds, particularly of crinoid ossicles. |
| B6 | 45 | Greenish-brown, grading to purple at top surface, micaceous mudstone. |
| B5 | 80 | Parallel bedded, brown, sandy micaceous siltstone, grading up to B6. Few fossil moulds present. |
| B4 | 10-15 | Brown 'rottenstone' in green, fine sandstone matrix. Base bioturbated, with flakes of greenish mudstone incorporated with fossil fragments. |
| B3 | 5-10 | Grey micaceous mudstone drape on top of B2. |
| B2 | 20-25 | Very crumbly, highly fossiliferous 'rottenstone'. Fossil |

| | | |
|---|---|---|
| | | types unidentifiable due to breakdown. Flakes of bright green micaceous mudstone with pockets of fine sand. |
| B1 | 460 visible. | Parallel bedded, greenish, fine micaceous sandstone (bottom not visible) grading into B2. Contains small rip-up clasts of greenish micaceous siltstone. Splits preferentially along fine bedding of less fine sand and flat lying mica crystals. |

Samples of all the beds were taken for study and reference, and with the specimens illustrated in Figs 5-7, have been deposited in the geological collection of the Bristol Museum and Art Gallery.

## DISCUSSION

The exposure of the Damery Beds at Damery Stables quarry confirms many of the features described by earlier workers, particularly Curtis (1972). Fine grained sandstones alternate with generally thinner bands of siltstones and mudstone. The sandstones form 78% of the beds exposed, confirming Curtis' view that they predominate. They also vary in thickness, often wedging out laterally and showing scour and fill structures (B38, B41) (Fig 4). They are hard, and break into blocky irregular pieces. Based on visual estimation only, there are no sandstones coarser than 250 microns in the exposure, although coarse grained sandstones have been observed at the base of the succession elsewhere in the Inlier (Curtis 1972).

The colours of the rocks range widely, from greyish- green to mottled red, with the mudstones displaying the brightest colours, especially when wet. The reddening has been attributed to staining from once overlying Triassic sediments (Curtis, 1972) and this view is supported by the increased reddening of joints and fractures in the specimens from the exposure and from other localities in the Inlier

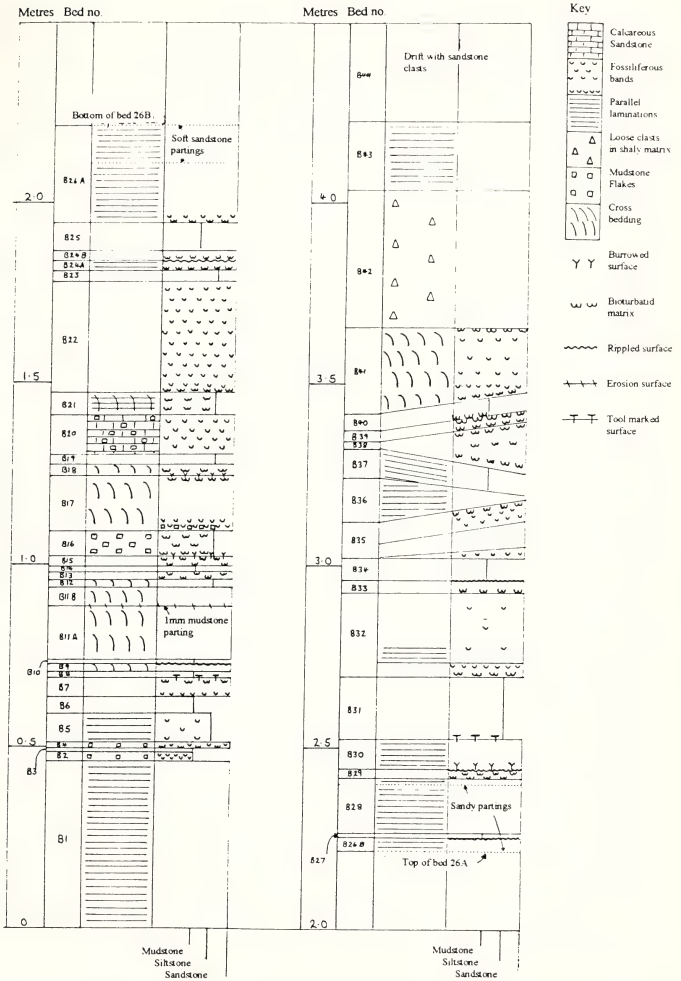


Figure 3 A schematic sedimentary log of the Lower Silurian Damery beds of the Tortworth Inlier

Fig. 4 General view of the Damery Stables quarry face. Scour and fill features are displayed from centre to left of centre. (Bed 32 is the thick sandstone immediately above the hammer.)

It has been reported that the sandstones are, in places, micaceous (Curtis, 1972). In fact, in the exposure, 33 of the 44 beds logged, ie 75%, contained mica, ranging from very fine flakes, only distinguishable with x10 magnification, to a small number of beds where mica predominates. This causes the beds to split readily along the current bedding due to the flat alignment of the mica flakes. There is no evidence in the exposure to show increasing abundance of mica, although it has been reported that mica is an increasingly significant component in the sandstones of the Wenlock successions. In the Long Quarry Formation of the Llandovery-Llandeilo area, highly micaceous sediments give clear evidence that metamorphic schists within the Precambrian source to the south were, by then, widely exposed and undergoing rapid erosion (Cope & Bassett, 1987).

Some of the sandstones are calcareous, with bands that are crowded with fossils, mainly of small brachiopods and crinoid ossicles, while others display sparsely distributed specimens. When weathered out, these form 'rottenstones' but most unweathered specimens are well preserved throughout the sequence.

Fig 5. Corals in life position in Damery Beds sandstone (bed B 41) (Scale bar in centimetres).

The whole fossils and disarticulated debris do not show any current alignment, nor are any individual beds dominated by a single species or group. Fossils in life positions have not been reported from the Damery Beds (Benton and Hiscock 1996). However, in bed B41 the sandstone shows rugose corals located in an irregular band with the absence of any other fossil group. This strongly suggests that early diagenesis and cementation of the sandstone had produced a hard surface that supported the corals in life position for a short period until they were overwhelmed by further sediment (Fig. 5).

Excavation of the old quarry removed much loose material from shale to large blocks. In the course of sorting through this material, good trace fossil specimens were recovered. These, and those found *in situ*, confirm that *Palaeophycus* is the predominant species, with the burrow size and morpholoigy ranging widely, as described in Benton & Hiscock (1996). The loose material provided good specimens with tool and prod marks. (Fig.6). Some blocks show particularly obvious loaded flute casts covered in a thin (2mm) mudstone drape (Fig. 7) A similar feature was logged in bed B3, although flute casts as obvious as those in the loose material were not seen in the section.

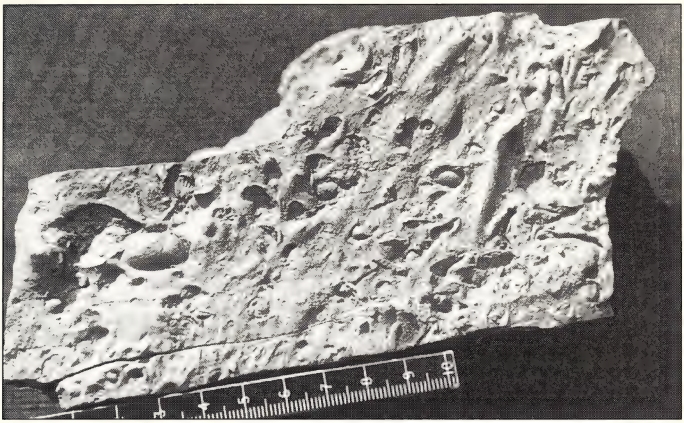

Fig. 6 Tool marks and resting impressions produced by brachiopods, gastropods (loxonema sp) and bivalves in Damery Beds sandstones.

Fig. 7 Loaded flute casts with thin mudstone drape in Damery Beds sandstone.

A few blocks of the excavated material displayed slickensides but the source of these was not evident during the logging of section B. A small bed high in section A showed slickensides, although careful examination of the sequence did not reveal faulting.

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## REFERENCES

BENTON, M. J. & HISCOCK, C. (1996).Lower Silurian trace fossils and the *Eocoelia* community in the Tortworth Inlier, SW England. *Proceedings of the Geologists' Association*, 107, 199-208.

BRIDGES, P. H. (1975). The transgression of a hard substrate shelf; the Llandovery (Lower Silurian) of the Welsh borderland. *Journal of Sedimentary Petrology*, 45, 79-94.

CAVE, R. (1977). *Geology of the Malmesbury District.* Memoir of the Geological Survey of Great Britain, Sheet 251 (England and Wales).

COCKS, L. R. M., HOLLAND, C. H. & RICKARDS, R. B. (1992). *A revised correlation of Silurian Rocks in the British Isles.* Geological Society, London, Special report, 21, 1-32.

COPE, J. C. W. & BASSETT, M. G. (1987). Sediment sources and palaeozoic history of the Bristol Channel area. *Proceedings of the Geologists' Association* 98 (4), 315-330.

CURTIS, M. L. K. (1972). The Silurian rocks of the Tortworth Inlier, Gloucestershire. *Proceedings of the Geologists' Association.* 83, 1-35.

HURST, J. M., HANCOCK, N. J. & McKERROW, W. S. (1978). Wenlock stratigraphy and palaeogeography of Wales and the Welsh borderland. *Proceedings of the Geologists' Association.* 89, 197-226.

KELLAWAY, G. A. & WELCH, F. B. A. (1993). *Geology of the Bristol District special sheet.* Memoir of the Geological survey of Great Britain.

MORGAN, C. L. & REYNOLDS, S. H. (1901). The igneous rocks and associated sedimentary beds of the Tortworth Inlier. *Quarterly journal of the Geological Society of London,* 57, 267-284.

SIVETER, D. J. ,OWENS, R. M. & THOMAS, A. T. (1989). *Silurian field excursions; a geo-traverse across Wales and the Welsh borderland.* National Museum of Wales, Geological series No 10, Cardiff.

ZIEGLER, A. M. (1965). Silurian marine communities and their environmental significance. *Nature,* 207 270-272.

ZIEGLER, A. M., COCKS, L. R. M. & BAMBACH, R. K. (1968). The composition and structure of lower Silurian marine communities. *Lethaia.* 1, 1-27.

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***Proceedings of the Society,*** Volume 58, for 1998.

Besides the annual reports on botany, invertebrates and mammals in the Bristol District, this issue contains original papers on a recent exposure of the Lower Silurian beds of the Tortworth Inlier, another on the late Triassic strata at Aust, and on the mines and quarries of Clifton.

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